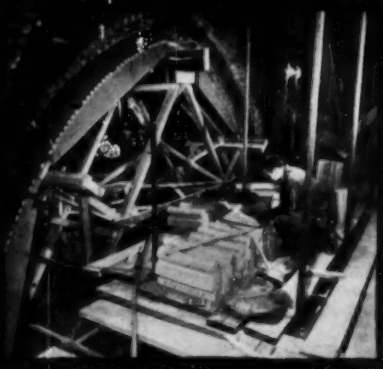
NOVEMBER
1953

DIGEST



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The bank might have spent weeks tracing the error—had it not been for a machine that threw new light on the matter

In 5 minutes they screened 600 suspects ...and found the culprit!

Several thousand checks were cleared that day. Later, an error of £100 was revealed. How to find it without disrupting daily work?

This was the problem which recently faced the Commercial Bank of Scotland. Normally, it would have required reference to all amounts of £100 or over. And if that failed, an examination of every check under £100.

This, however, would have entailed hours of extra work for the staff.

The Bank's method was far less complicated, far faster. Knowing the day the error had occurred, they simply ran off a film of their clearing for that day on the Reader of their Burroughs Microfilm equipment.

Result? Within minutes, the "guilty" check appeared on the screen. Scrutiny showed that in typing, the "one" of £120 had merged with the printed £ sign—leaving a clear amount of only £20 showing.

What about you? In any business, document-storage must be considered in terms of the time it takes to trace important records, the cost of storage space and safety.

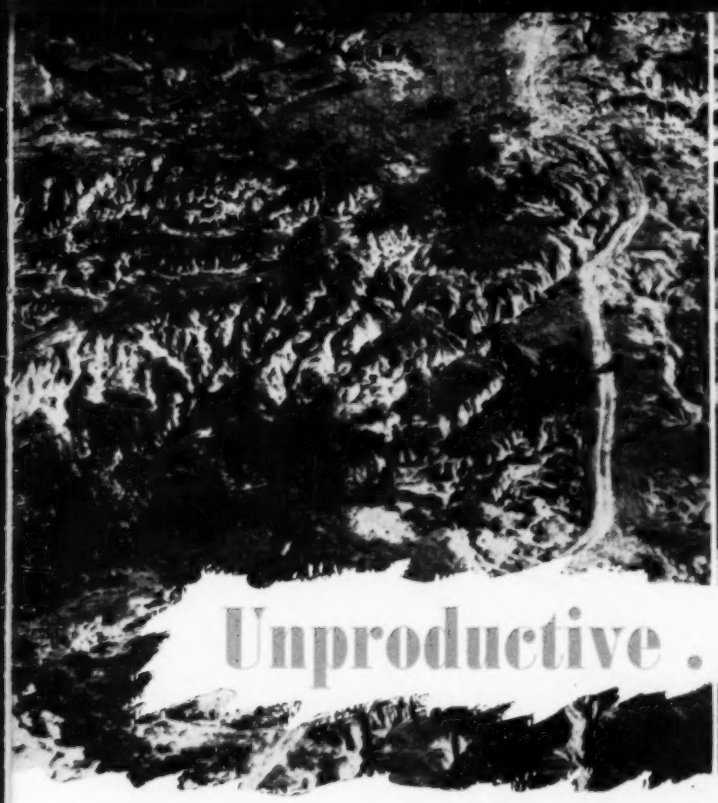
Records transferred to compact, non-inflammable spools of Burroughs Microfilm are easily filed and easily located because they remain in their fixed and proper sequence. They're tamper-proof and extraction-proof. They provide savings of over 99% in filing space alone!

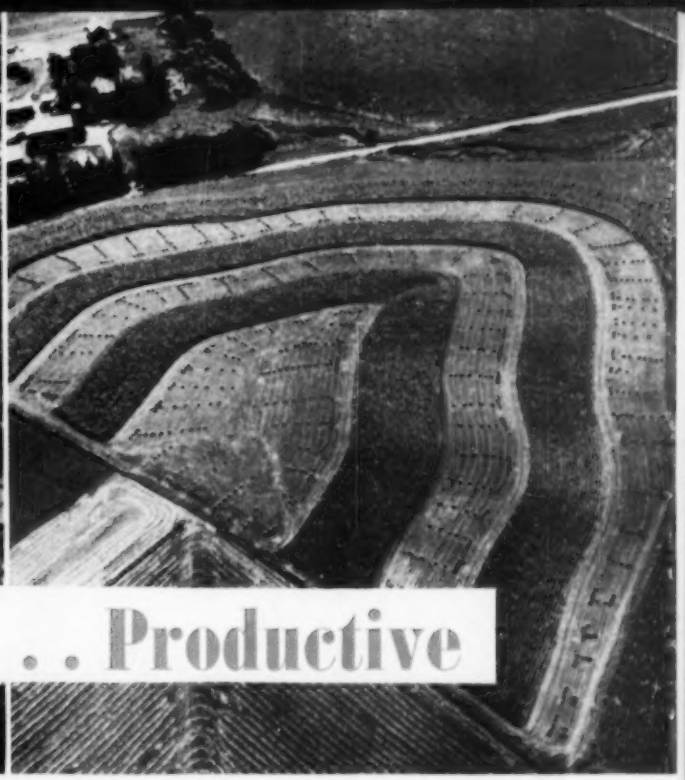
Call the Burroughs man. He can give you expert advice on the latest methods and machines that do the work faster and at lowest cost. He'll give you expert service, too, with routine maintenance or fast emergency repairs. You'll find him at Sales and Service offices around the world. Burroughs Corporation, Detroit 32, Michigan, U.S.A.

Seen here at the Recorder of Burroughs Microfilm Equipment in use at the Commercial Bank of Scotland is Mr. R. M. Thomson, the Burroughs man who supervised installation of the equipment that found the missing £100.

FOR EXPERT ADVICE IN ANY FIELD OF BUSINESS FIGURES...

CALL THE Burroughs MAN





Unproductive . . . Productive

TRACTOR METHODS CAN CONSERVE THE SOIL

The soil is the most valuable natural resource in the world. It deserves the best care and management possible to prevent erosion and preserve fertility. No farm or nation has too much good land.

Look at the two pictures above. The land shown at the left was not farmed properly. Now it produces no income and is useless to its owner. The farm shown at the right is highly productive and will remain so because it is protected by contours and terraces.

Modern tractors and implements offer an effective and economical means of improving crop production and preserving value of the land. For example, the Allis-Chalmers Model WD Tractor and plow shown below is building a terrace designed to hold soil and water on sloping land.

Allis-Chalmers manufactures a complete line of modern tractors and hydraulically controlled implements ideally suited to a system of soil conservation. Consult the Allis-Chalmers distributor in your area for information regarding soil conservation with regular farm equipment.

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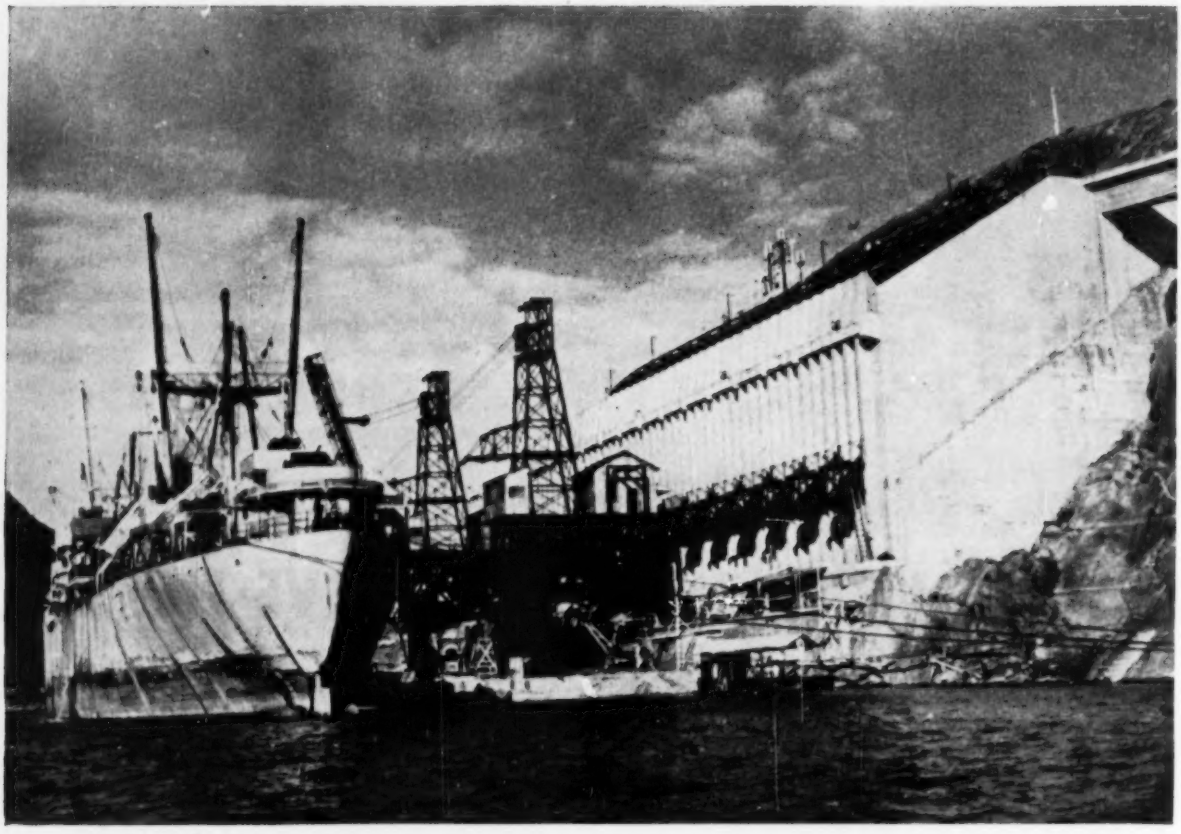
LINK-BELT research and engineering serve industry world-wide

Loads 1800 tons of Brazilian ore hourly



Ore from bunkers is loaded by three Link-Belt traveling towers. Each is controlled by a single operator and equipped with automatic safety devices.

LINK-BELT equipment at Port of Vitoria provides safe, push-button handling

SUPPLEMENTING the free world's supply of iron ore, the Itabira mines are now exporting 1.5 million tons per year through the Port of Vitoria. And this tonnage may soon be doubled.

Ore is hauled 373 miles by rail from the Brazilian state of Minas Gerais. At the port are three Link-Belt traveling dock loaders, each with 600 tons per hour capacity. These receive the ore from bunkers, weigh and deliver it along 77-ft. belt conveyor-equipped booms to the ships' hatches. Wide horizontal and vertical boom adjustments compensate for variations of tide and ship design.

Whether you're handling large or small tonnages of bulk materials, Link-Belt offers unique facilities. Here is a world-wide organization with a vast background in conveying and power transmission application. Working with a complete line, our engineers can help you get the equipment that best meets your exact requirements. For facts, contact your Link-Belt representative, or write us direct.

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13,347

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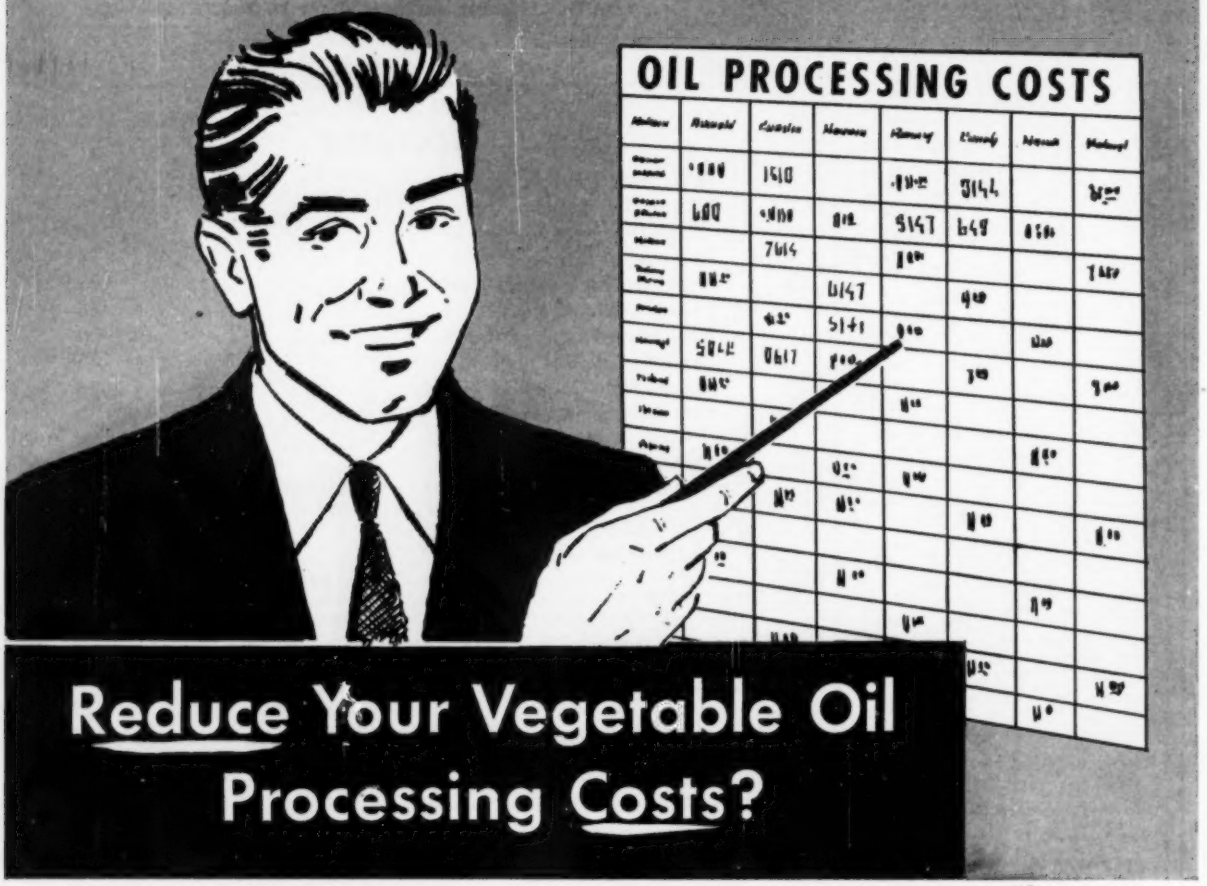

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To help oil millers determine how they can increase their profits, we are now offering a free engineering survey. This survey of your oil mill gives you actual facts and figures on how your oil milling operation can be improved. There is nothing else like it available from any other source. It is based on Anderson's 50 years specialized experience in serving 4000 oil mills all over the world plus new modern processes recently developed by Anderson engineers. Write today asking us to make without obligation an Engineering Survey of your oil mill.

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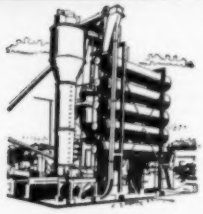

Anderson Solvent Extraction Unit

Anderson **Heavy Duty** High Capacity Expeller

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Westinghouse industrial fans offer the highest efficiencies available anywhere.

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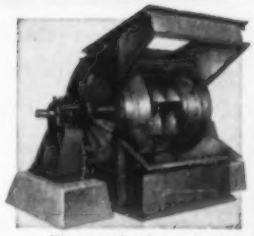
Other Westinghouse fan capacities range from 500 to 300,000 cubic feet per minute, in sizes from 12 to 108 inches in diameter, with mechanical efficiencies between 78 and 85 per cent.

Industrial fan applications require careful, individual engineering to meet each specific problem. Westinghouse "Application Engineering", plus the right equipment, can save original costs many times over through greater efficiency and better all around performance.

Whatever *your* requirement—*exhausting fumes, vapors, dust or ventilating of generators, motors and other equipment*—Westinghouse is ready to apply specialized experience for installations from 500 cfm upwards. Let us show you how maximum fan efficiency saves you money! Write to address below for free copies of catalog #1320 and catalog #600.

HYDROGEN FUMES from a series of cyanide furnaces are exhausted through hoods by 26 standard Axiflo fans mounted on the chemical plant roof. This installation requires less fan capacity than exhausting general plant area.



Illustrated, above, is the highly efficient AIRFOIL fan.

YOU CAN BE **SURE** ...IF IT'S

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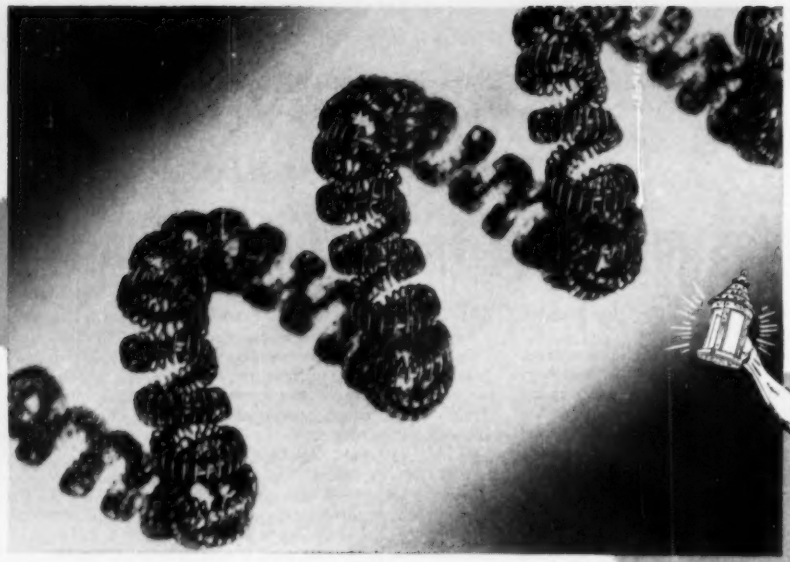


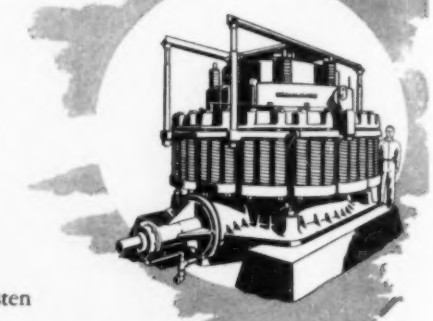
Shown at the left is a view of the triple-coil tungsten wire used in many modern fluorescent lamps. (Photo courtesy General Electric Lamps)

The "ARISTOCRAT OF RARE METALS" might have helped Diogenes . . .

If *TUNGSTEN*, the *"aristocrat of rare metals"*, had been discovered in his time, the Greek Cynic, *Diogenes* might have been able to carry a much brighter lamp to aid in his search for an honest man. For among the many contributions of this metal to modern civilization is the tungsten filament which gives a quality of artificial light otherwise unattainable.

Due to low grade characteristics, and the hard abrasive rock in which tungsten ore is generally found, producers must attain desired particle size for maximum recovery as quickly and economically as possible. It is significant to note the use of SYMONS® Cone Crushers by many of the large tungsten producers . . . who find these crushers particularly suited to tungsten ore reduction because of maximum utilization of crushing surfaces against the highly abrasive material, with minimum wear.

Thus, in tungsten operations . . . *as in all of the great ore and industrial mineral operations the world over* . . . SYMONS Cone Crushers are relied upon to efficiently produce great quantities of finely crushed product at low cost.



SYMONS Cone Crushers . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

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Dealers in Principal Trading Areas Throughout the World

XC 353

BUSINESS TRENDS

BUSINESS throughout the U. S. remains brisk. The few isolated weaknesses in the economy do not foretell any real signs of a recession. Adjustments are occurring in several fields. Altogether, they will cause less than a 5% drop in industrial activity during the fourth quarter. For a forecast of 1954 business, watch our January issue.

But one phase of the U. S. industrial machine bears close attention. That is the dangerous inventory level here. Any number of factors could start a wave of inventory dumping. The result could quickly convert a mild setback into a deep-rooted recession.

Present inventory glut consists of a huge $78-billion of goods held in warehouses, plants, and stores. It is most vulnerable to any slight dip in manufacturers' sales because most of the 1953 inventory gains were chalked up by manufacturing firms.

Lower backlog of new orders in face of high inventories can be serious. Part of the larger inventory is attributed to the smaller number of unfilled orders. Over one-third of all U. S. companies report reduced backlogs.

Buyers are limiting their advance orders because they realize their requirements can be satisfied easily and quickly. Unfilled contracts are down 7% this year.

Inventories are especially burdensome in the appliance field. Washing machines, freezers, refrigerators, stoves, and television sets represent the bulk of the increase. Metal goods, wire and cable, brass, tires, chemicals, plasters, coffee, soap, and sugar also are in abundance.

Automobile production is suffering from the highest inventories since World War II. As a result, three top car manufacturers have had to curtail employment sharply. Producers of farm machinery and transportation equipment are hardest hit in the heavy durables line. Their stocks on hand have piled up 30 and 19%, respectively. Although over-all pharmaceutical inventories have fluctuated only slightly, one prominent drug house has registered a 50% gain from $4-million to $6-million.

RETAIL STORES will enjoy their best Christmas volume in years. Imports of finished goods will feature 1953 Yule sales. Wearing apparel, toys, novelties, and household accessories have been arriving from abroad in record quantity.

Japanese sales to America will surpass by far last-year's total. Christmas ornaments lead the list of increased orders. Other popular-priced items from Japan are knitted gloves, rugs, bamboo ware, toys, china, and porcelain.

Italian merchandise is flooding the low- and medium-price counters of department stores. Americans are specially impressed with glassware, kitchen utensils, and straw clothing accessories made in Italy. For the first time since the early 1930's, Spanish hand-made goods are in demand. But buying is limited because of small selections.

British handbags, chinaware, bicycles, and high-priced woolens will be bought by more Americans this Christmas than last. Stores are well prepared for the greater interest. They also expect increased demand for West German clocks, jewelry, linens, and cutlery. One of the largest department stores in the U. S. doubled 1952 purchases of Yule merchandise from Germany.

U. S. AUTOMOBILES will be marked by many innovations in 1954. Both the driver and passengers will benefit tremendously from proposed changes. Manufacturers intend to increase horsepower by 15%. Installation of automatic transmissions will be emphasized. The conventional gear shift will be eliminated in nearly two-thirds of all automobiles made.

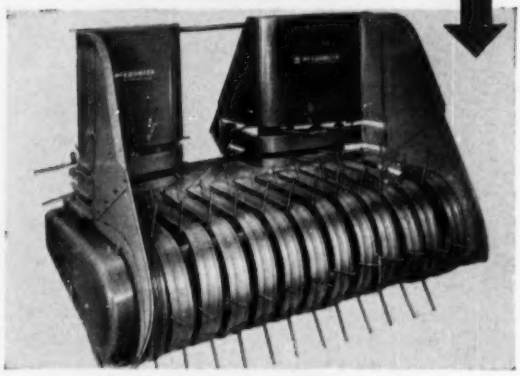
Influence of European cars will be more noticeable than in the past. New models will be longer and lower. Optional equipment, such as wire wheels or a spare tire mounted on the back, will increase in popularity. More of the speedy, continental-type sports cars will be made and sold in the coming year.

Accent will also be on comfort. Practically all U. S. automobiles are wide enough to carry three people in both front and back seats. Greater leg room is another objective of the new models. The "wrap-around" windshield, which gives the driver far more vision, will be common. Count on more push-button and adjustable seats. Air conditioning, rapidly growing in demand, will appear in several higher-priced cars.

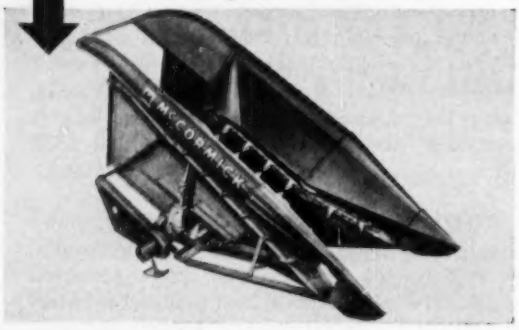
Power steering and power brakes will make driving much easier. Additional cost for power steering is around $150. Power brakes can be included for an extra $50.

Chrysler Corp. is already introducing its new cars. First public showing for General Motors is scheduled for December. The new Fords will not make their debut until January.

Harvest both hay and



row crops with the



• This machine makes *one man* the master of all forage and silage crops. With pick-up hay attachment, you can harvest forage up to 25 tons per hour. And it gathers all the crop, green or cured, carries it evenly to the cutter and chops it to the desired length.

For row crops, the dual-purpose McCormick International 20-C Field Harvester is equally efficient. Using the same basic unit, which includes feeding mechanism, cutter-head and blower, the row-crop attachment is easily connected in a few minutes. The flywheel cutter with six knives keeps a steady speed in the heaviest crops and fills a big truck in five minutes.

This big-capacity field harvester is driven from the power take-off of a 3-plow or larger tractor, or you can get the 49 hp. mounted engine and pull it with a smaller tractor. See your McCormick International Distributor for more information. International Harvester Export Company, Chicago 1, U.S.A.

NEW McCormick International Field Harvester

WASHINGTON REPORT

CONVERTIBILITY of key European currencies is still a long way off—despite the pious hopes expressed at the recent International Monetary Fund conference.

Some progress has been made since R.A.B. Butler's pilgrimage to Washington last March. Washington is less coldly non-committal now, is paying at least lip service to the idea of a common drive toward convertibility. European nations no longer fear that sterling convertibility would mean new bars to their exports to the sterling area. Britain and the Commonwealth nations are sticking to their proposals despite U.S. stalling.

But the obstacles still ahead are formidable. Political opposition to convertibility is boiling up in Britain—in Conservative as well as Labor ranks. Key opposition argument is that the U.S. is headed for a recession and that the sterling area, therefore, should soften the blow by cutting ties with the dollar market as much as possible and reorienting its trade toward other markets.

Continental European nations have their doubts too. Convertibility, they realize, would doom the European Payments Union. That would mean the end of easy trade credit for debtor nations like France. EPU's passing also might further dim their hopes of European unification as it provides an embryo central banking system for such a union.

Biggest question mark, of course, is the future of U.S. foreign economic policy, which is now being studied by President Eisenhower's Foreign Economic Policy Commission. Meanwhile, Britain has made its minimum terms for risking convertibility clear. They are:

- The escape clause in the Reciprocal Trade Act must be killed. Otherwise, foreign exporters have no guarantee that they will not be shut out of the U.S. market if they succeed in gaining a foothold.
- U.S. policy must be clearly set in the direction of steadily lowering trade barriers over a period of years.
- The administration must clarify and gradually liberalize "Buy American" policy.
- Convertibility must be backed by a dollar stabilization fund of at least $7-billion.

The administration's chances next year of getting such liberalization of U.S. foreign economic policy now look slim. Congress will balk at lowering trade barriers in an election year, particularly if signs point to a downturn in U.S. business activity by spring. Eisenhower will be lucky to hold the tariff line where it is. His desk already is cluttered with Tariff Commission recommendations for duty increases on hand-blown glass, oats, wool, frozen fish fillets, lead, zinc, and watches.

Then too, the budget-conscious administration itself is against putting any additional money into a stabilization fund when mighty efforts are being made to cut expenses and taxes. And the reserve position of the major nations almost certainly will weaken next year when economic aid is terminated.

TREASURY AND STATE Departments are skirmishing over Export-Import Bank's lending policy (see page 11). The Treasury Department wants the bank to bar any new development lending abroad unless private banks agree in advance to take up the notes with a bank guarantee. The State Department wants the bank to be permitted to lend up to the limit of its yearly profits and repayments—about $200-million a year.

The State Department agrees that the bank should try to sell more of its notes to private investors with a bank guarantee. But it would not make prior agreement by private investors to take the notes a prerequisite for a bank loan.

Test of who's winning the battle will be the decision, expected soon, on New Zealand's application for a $20-million loan for a lumber, pulp and paper project.

BRAZIL's new petroleum law setting up a state monopoly for oil development—Petrobas—has caused some concern in Washington. U.S. officials privately predict that:

- Petrobas will not bring in the oil. It will have plenty of cruzeiros, thanks to the special levy on oil imports, but it will be short of dollars and technicians with the know-how necessary for successful exploration.
- Economic development will be held to a slow pace, inflation will be endemic, and foreign-exchange crises will be recurrent as long as Brazil must depend on heavy fuel imports to fill its domestic needs.
- New U.S. and World Bank loans will be hard to get now that Brazil has barred effective development of its petroleum resources by turning to state monopoly instead of the more efficient private foreign oil companies.

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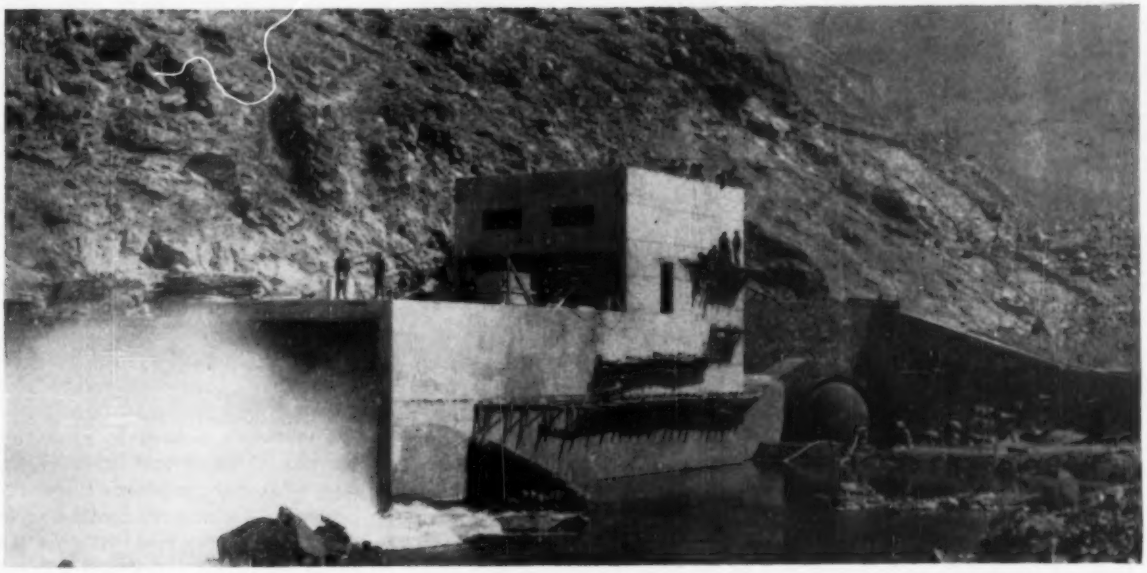


EXPORT-IMPORT BANK may not finance any more of these developments because of the possible new . . .

Ex-Im Bank's Policy: Economy

The U. S. government's budget-balancing drive squeezes Ex-Im Bank's loan-making ability. But a fight is underway throughout the world and policy may not become clear until early next year

A FIERCE CONTROVERSY has boiled up in Washington around one of the U. S. government's least controversial and most profitable institutions—the Export-Import Bank.

The outline of the argument has leaked out and U. S. foreign traders and investors, and businessmen and governments abroad, are joining the debate. Here are the two sides:

- Is Ex-Im spending too much money on the wrong projects? Does the aim of economy in government, and a balanced budget, dictate a cutback in the bank's lending?
- Or should the administration step up Ex-Im operations to compensate for dwindling U. S. aid and to stimulate foreign trade and investment?

The controversy started with the announcement of tentative Treasury plans to hold down the bank's lending, particularly for development purposes, and by the major reorganization of the bank recently carried out. Treasury officials feel that as a general rule the bank should confine its credits to the short-term field, leaving term loans to the World Bank.

They also feel that Ex-Im should lend only as it is repaid from past advances and to the extent that it is a revolving fund. They think that Ex-Im Bank credits should not add to a federal-budget deficit.

Reorganization has put the bank much more directly under the control of the Treasury Department. Under the new setup, the bank's bipartisan board of directors has been replaced by a single director, Major Gen. Glen E. Edgerton. The State Department no longer will be represented on the bank's board. The bank itself will lose its seat on the National Advisory Council. Taken together, these moves take the bank out of its policy-making role and make it primarily an executive agency under the Treasury.

The reaction abroad to these moves has been swift—and noisy. Latin Americans, especially, are concerned lest the bank's lending be curbed. Top government officials in every Latin nation besieged Dr. Milton Eisenhower about the new Ex-Im policy during his trip.

Eisenhower and his advisers admitted that a change was coming, but explained that the American people had voted for economy in government last fall and that the

administration had to give it to them. It was their suggestion that the World Bank should be the primary source of development capital.

Latin Americans do not agree. They point out that Ex-Im has been the chief source of basic development aid, that it has consistently netted profits for the Treasury, that it has helped American business—investors and exporters—right along. Latins argue, too, that the World Bank could not replace Ex-Im. Its lending power is limited by a shortage of funds and by the fact that it can only lend under government guarantees.

In the U. S., many businessmen and officials privately think that hobbling Ex-Im would be poor policy. And they wonder why the bank is an economy-drive target.

The Senate Banking & Currency Committee has launched a study of both Ex-Im and the World Bank. There is no reason to believe that the study, designed to find ways to speed the flow of world trade, will be a hostile one. There have been no complaints from Congress that Ex-Im was spending too much.

That is true despite the fact that appropriations for the bank show up on the budget as a deficit item. The budget does not show interest, $45-million last year, and repayments, now running $300-million to $400-million yearly, flowing back into the Treasury.

It is still too early to tell just how administration policy on the bank will shape up. But it has had its effects on Ex-Im's loan-making ability. Japan was recently denied a $15-million line of credit by the Treasury to finance installation of an extensive telecommunications system. The Ex-Im Bank wanted to make the loan to make possible export of equipment that could not be financed through private banks. Treasury officials gave no reason for their position on the loan.

It looks like the bank will be pushed into the background of U. S. foreign economic policy. But there were some signs that the uproar Milton Eisenhower encountered, and the growing talk at home, were giving the Treasury and the White House some second thoughts. No final decision is expected until next year.—Business Wk, Aug 15, p136

CURTIS W. MCGRAW

Everyone who knows the McGraw-Hill Digest has known Curtis W. McGraw, chairman of the Board of the McGraw-Hill International Corporation. The enduring mark of his leadership in the task of keeping business well informed and shaping the technical development of industry must remain on these pages. But it is something out of the lives of all of us that he died September 10 after 33 years of unselfish, untiring service. He will be succeeded by his brother, Donald C. McGraw.

Coming—More Cortisone

Synthetic cortisone now looks like a good commercial possibility. Monsanto Chemical Co. has simplified the Woodward synthesis method developed at Harvard University and trimmed 20 steps from the method's original 48 steps.

Monsanto's method, unlike the original procedure, utilizes commercially available reagent materials. They include potassium amide, methyl magnesium bromide, silver acetate, N-bromosuccinimide.

One thing the new technique may do is to end for all time the problem of making enough cortisone. It may also end the intensive efforts underway to develop supply sources more abundant than ox bile. But it may not be alone in the field: well worth watching is Merck & Co.'s synthesis starting from benzoquinone.—Chem Wk, Sept 5, p22

School for Dealers

With one eye on the future, Detroit makes sure its dealers are up to date on latest selling methods

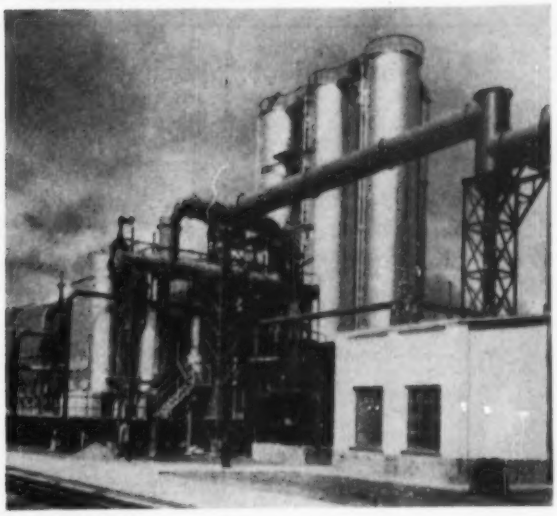
THROUGH TRAINING of future dealers, the big three of the automobile industry (General Motors Corp., Chrysler Corp., Ford Motor Co.) seek permanency in their dealer organizations and a continuing high standard of service. It is an idea worth thinking about in any industry where a product has to be sold and serviced through dealerships.

Chevrolet's school is primarily for dealers' sons and other young men who expect to become Chevrolet dealers. Average student's age is 30 yr. Mimeographed textbooks are prepared by Chevrolet and revised frequently. They are supplemented by lectures, blowups, slidefilms, motion pictures, playlets, and other aids. The faculty is composed of Chevrolet and General Motors Corp. executives and department heads.

Subjects include the history of the industry and GM, market analysis, Chevrolet quality dealer program, principles of used-car operation, budgets, and trips through Chevrolet plants. Written tests are given frequently, and a final examination is required.

Chrysler Corp. employs the conference type of study. It stimulates active discussion of practical problems of dealership management and encourages the exchange of ideas on all manner of operational matters. Like the Chevrolet plan, students include dealers' sons, dealers, and executives of dealerships.

Ford Motor Co.'s Merchandising School gives a course that lasts 4 weeks. As a basis of the course, management speakers present a well designed concept of Ford's history and organization and of its products and services to dealers. This is followed by instruction in the operation of a Ford dealership as an independent business. Students are familiarized with promotional media and told how to use them in training their own sales groups.—Am Business, Aug, p18



Donkeys and petroleum, two facets of an unusual economy, highlight . . .

Spain: From Boom to Crash

A down-to-earth appraisal of Spain's economy is underway. The prosperity-adversity way of living has to change if Spain is to take its place among the world's free nations.—An original Digest article

MADRID—Spain's 1951-52 boom is gone. Per capita annual income has fallen from that period's $250 down to $205 this year. And the country's foreign-trade deficit is a huge $150-million. Factories are running part time because of a shortage of imported raw materials. Spain's wheat shortage is taking bread from the people's tables.

Add these up and you will see why politically static Spain is being forced toward a realistic approach to its economic woes. Practically all of Spain—from the farms of Andalusia to the industrial centers of Barcelona—talk in terms of U. S. aid now. No longer do people scoff at American aid as "capitalist attempts to entangle Spain."

So both countries have finally signed an agreement to establish U. S. air and naval bases in Spain. With the agreement goes $226-million to Spain—$85-million for economic aid, $141-million in military aid. It is a long-term agreement that can run as much as 20 years. Thus, Spain's growing economic troubles will get relief.

What's behind the change in attitude? The German-born Spanish economist, Dr. Tertsch, feels that inadequate rain, peace in Korea, Stalin's death, the peace offensive launched by Russia and also England have had their effects on the largely agrarian and smaller industrial economy of Spain. "Western Europe," he said, "is not buying Spanish raw materials like chrome, mercury, sulfur, and others that they would during the armament-producing years."

The 1951-52 boom, due largely to adequate rainfall and hydroelectric-power production, improved Spain's physical production. A Ministry of Finance official said that the "1951-52 expansion in output was sufficient to relieve the most severe pressures in the living standards of the working population, and it permitted the Spanish government to achieve internal fiscal and price stabilization."

But by spring 1953, Spain had lost most of the seller's markets abroad. An exporter of mercury explained the sharp decline in Spanish commodities of importance in international trade this way: "The Korean boom is over; conditions in the world markets are competitive; Spain's incomplete and partially obsolete industrial plant has great difficulty in marketing manufactured goods abroad."

From his own experience he says, "India bought 48,000 flasks of mercury. India has neither utilized it nor resold it in world markets. The result—I am stuck. There is no demand, and no method by which I can sell my goods elsewhere. But I don't care. It is a matter of time, for after all, Spain has a monopoly in the production of mercury."

But what is true of mercury is not true of other commodities. To keep Spanish textile industry run-

Badajoz Project: Spain Aims for Progress

Workers' Homes in Badajoz

In a wilderness of Spain's "desert Siberia," a $180-million irrigation, colonization, industrialization, and electrification project promises hope, food, and work for 800,000 neglected inhabitants of the province of Badajoz. Spain's most ambitious development project of the decade aims at modernizing this huge province, irrigating 500,000 acres, building 21 new villages and 80 factories. Three years have been spent on the project with twelve more still to go.

The over-all effect of a completed Badajoz Project on the economy of Spain is too early to judge. On the face of it, it will mean a boom and better living conditions not only for the inhabitants and neglected regions of Badajoz, but also electricity and water for the neighboring provinces.

For the future, Badajoz is not an isolated plan in Spain's desire for economic progress. Several other projects, although on a smaller scale, are keeping the Spanish government busy.

ning for at least two days a week, Spain must import 88,000 bales of cotton. Spain herself produces about 15,000 bales.

The international price of cotton is $0.90 a kilo, but the Spanish textile industry must pay $1.50. The government does not have the foreign exchange available. But to keep the industry running, Spain undersells other commodities, like sugar and ammunition in the Middle East. That way it can buy cotton on the international market. The state does not take the loss—it is transferred to the industry.

The Ministry of Agriculture had planned to supply tractors and fertilizer to the farmers of Badajoz, Andalucia, and Barcelona. Both tractors and fertilizer were to come from the U.S. and be largely financed with the remainder of the $62.5-million Export-Import Bank credit granted to Spain in 1951. Now a large part of this money must go to import wheat.

Even though the production of wheat fell, the production of cereals and rice rose. The 1952 rice crop was the highest in two decades. As against the previous high of 293,000 tons in 1931, the present year's production has been 325,000 tons.

National characteristics, however, cannot be ignored. Senor Francisco Martinez, called Pako by his friends, and a tractor driver in Andalucia, is not a keen rice eater. "It just does not go well with wine," he feels. "I must have bread even if it is soaked with wine—with what will you soak rice?"

Olive planters in the south face a grim prospect. The olive crop in 1952 and 1953 was the lowest in 20 years. As against the 1950 crop of 700,000 tons, 1952 only had 220,000 tons. And olive oil is an essential part of the staple diet of the Spanish lower middle class and upward economic strata.

The owner of a small restaurant in Granada described the problem that such a situation is likely to cause. "The entire salad crop will go to waste this year," he said. "Who can eat salad without olive oil, and where is the olive oil?"

The Spanish wine industry, third in the world (the first two are France and Italy), is specially important to the Ministry of Agriculture. Explained a small-time wine trader in a small, dingy, bylane cellar of old Madrid, "Take wine away from Spain and what are you left with . . . nothing, nothing, not even God."

For the truth is that in spite of a 37% reduction in wine output compared with that before the civil war, the vineyards occupy an important place in the Spanish economy. The 1953 output has been roughly estimated at 63-million liters and worth $136-million. The 1951 output was only 40-million liters. However, these vineyards are not bringing in the desired dollars.

Exports to America of wines have been slowing down. The reasons are given by Señor Fernandez, a fashionable wine exporter. "America is turning to scotch from the wines. The export of sherry to America has considerably been reduced. But our best customer is scotch-producing Britain. Last year we exported to her $2.5-million worth of wines."

In spite of good years of Spanish economy, the margin between production and basic consumption cannot build a foreign-exchange reserve to cope with adverse years. This fact was focussed rather sharply at a cabinet meeting on July 14, when it was decided that Spain needs at least $200-million in the fiscal period, which began in July 1953, to overcome economic distress. Spain is getting wheat. But to keep her industry running, her labor employed, and her farmers at work, Spain must import tractors, fertilizers, certain raw materials (cotton, jute, ores) and export her wines, olives, mercury, sulfur.

From where must this aid come? Francisco Casana, owner of a restaurant in Madrid and at one time secretary to Jose Antonio, founder of the Falange party, perhaps represented the entire business community when he answered the question with one word: America.

The leaders of the Church say: America, but with no chains.

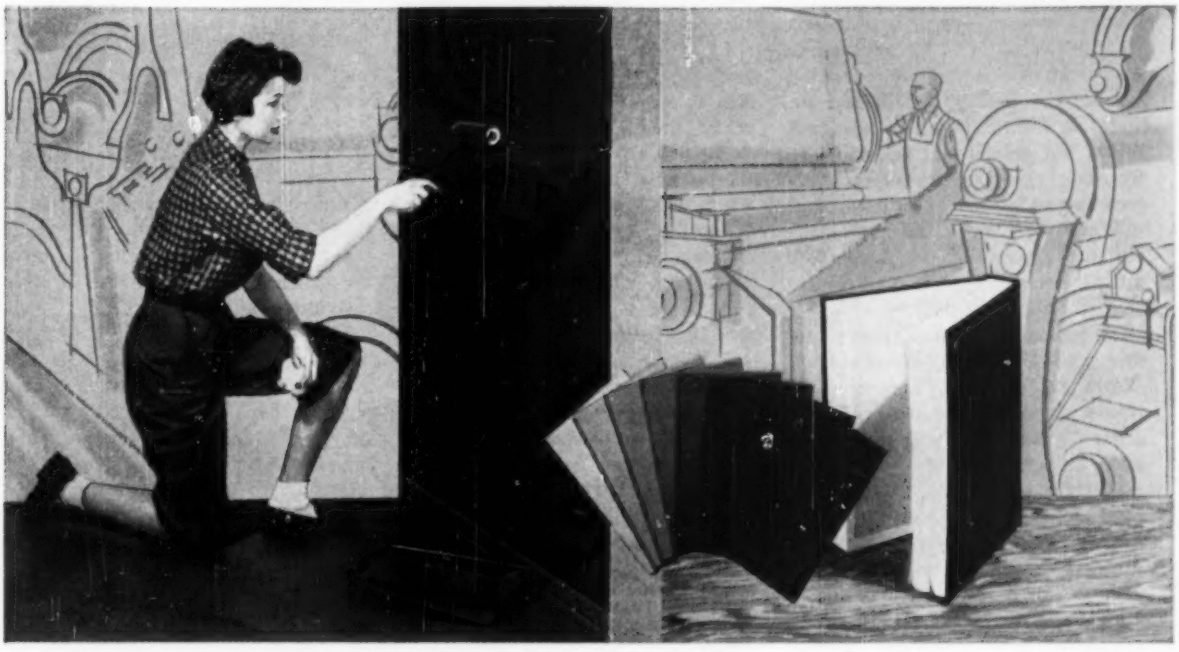
The Labor Minister, Señor Giron, who represents the labor and progovernment labor elements said: America, but no exploitation of Spanish labor.

And even the Falange party, at one time bitter opponents of American aid and American intents in Spain, said: America, but on our terms.

Whatever be the terms of any association with the U. S., the universal feeling in Spain is that America must not only pull her out of the present economic uneasiness, but also include her in American plans for subsidy and aid, and indeed a larger partnership, until

DOW LATEXES FOR THE PAINT AND PAPER INDUSTRIES

New and exciting latex materials create big markets for paints and printing papers



Improving the products of industry is the never-ending task of Dow's Research Laboratories. Today, industry is able to make new kinds of paints and finer papers because of Dow-developed latexes.

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We invite your inquiries regarding Dow Latexes and the potential they offer in creating new markets and improved products. Write to Dept. EX 3-55.

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DOW

"Why should a foreigner invest his capital . . .?"

Spain can develop and complete many of her own ambitious projects.

The prospects of business between Spain and America are perhaps the brightest spot. But a problem comes up. It lies in the ultra-nationalistic decree of Spain, issued in 1939 and still carried out in letter and spirit—no foreign investment in Spain can exceed 25% of total capital layout. At the instance of the Falange party, the decree is never debated. The Falange party also desires complete nationalization of all industry. Explained Dr. Tertsch, "Why should a foreigner invest his capital and be controlled by other shareholders at such uneasy terms."

Worse still was the fear of a shipping merchant of Bilbao: "I talked with a British and an American firm about joining me in a ship building enterprise, but from where do I get in Spain the 75% of capital. Worst of all the Falange party wants to nationalize the entire industry. Now who will join me in such a venture?"

But the Ministry of Finance and local politicians in Spain are hoping that Franco will soon announce either a repeal of the 1939 decree, or else the percentage may be decided on 51-49 basis. The main critics of such a scheme however remain the Falange party.

The Assistant Secretary General of the Falange party in Madrid expressed the party's policy in these terms: "Our party is pledged to the program of nationalization of industries. Failing that there may be here the same communist strength as in the rest of Europe and especially in Italy. The Church has not proved a powerful anti-communist force. You can see that from Italy. Only the Falange party can keep Spain on the side of anti-communism; and we must have the support of the people and the peasants."

The economists in Spain however do not feel so. Professor Lossou of Madrid said, "The project to reclaim the desert of Badajoz will cost over $180-million. Spain does not have the money. Will this completion of this project help communism or the lack of the project help communism? What does the Falange party really mean?"

Well, what does it mean? To many foreign observers of Spain, the radical faction of the Falange party is powerful vocally and not so powerful numerically. In Spain itself, the Falange party cannot claim a membership of more than 20% of adult male population. The extreme leftists and communists claim a membership of about 10%.

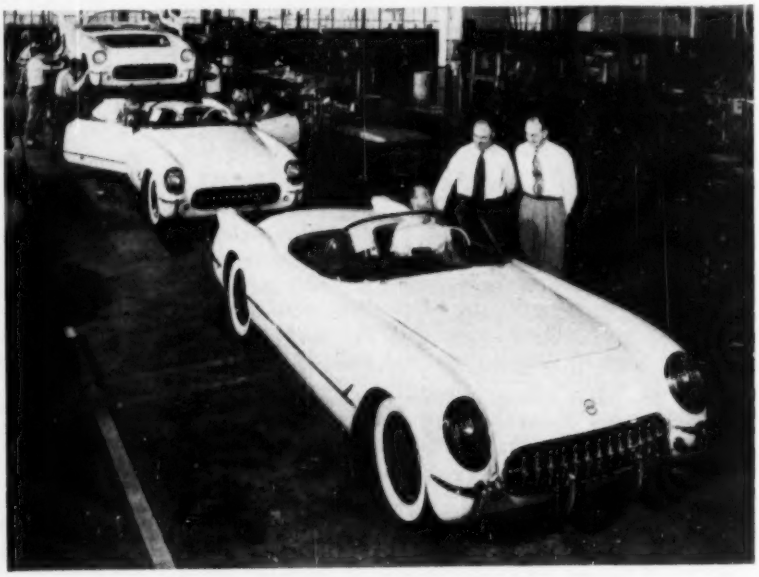
In the over-all strength, a private survey disclosed that out of the 100 members of the Falange party questioned, over 80% were quite willing to leave industry in the hands of private enterprise and the same amount suggested a repeal of the 1939 decree limiting the ratio of foreign investments in Spanish concerns. Initially among the 100, 90% were not even aware of the fact that such a decree existed.

But within one year, the entire Spanish populace and especially the intelligentsia has focussed its attention on the economic plight of the worker. Even those who in the private survey wanted industry in private hands spoke loudly and vehemently in terms of better living conditions for the worker. To General Franco, this economic problem is not as important as intricate political maneuvers and loyalty.

Although men around Franco have spoken and are sharply divided, Franco himself has not spoken or perhaps even decided. So secretive is Franco, and shrouded in such secrecy are his personal views, that even his closest associates and cabinet colleagues dare not venture to express views on Franco's behalf.

Foreign diplomats feel that Franco's decision on one question may answer many others. Would Franco permit American-Spanish joint commercial enterprise in Spain, with a liberal takeout quota in profits for sorely-needed foreign investments?

If the answer is "Yes," and most liberal and rational Spaniards are hoping so, Spain may start a new era of commercial progress. If it is "No," the present year-to-year marginal prosperity-adversity will continue to harass Franco's shaky economy indefinitely.



First Corvette Comes Off the Line

New American sports car is the plastic-bodied Corvette by Chevrolet. The company plans to make 300 this year and raise production to 1,000 a month by next year. The car is powered by the new Blue Flame engine, has a Powerglide transmission, costs $3,250. It is white with red cockpit and chrome trim. Length is 167 in.—Am Auto, Sept, p53

Change Your Antifreeze Even If It's "Permanent"

Tests by the U. S. National Bureau of Standards, the Society of Automotive Engineers, and several other associations have proved that "permanent-type" antifreezes are not permanent at all. Makers also advise that the best possible antifreeze should not be used more than one season, not because the antifreeze deteriorates, but because the rust inhibitor in the antifreeze loses its potency. Corrosion in the tight cores of the radiator can soon eat through the metal or clog it sufficiently to close off the tube.

Adding antirust preparations will give temporary protection, but since most of these compounds or solutions are intended to be put in water only, they may harm the antifreeze.

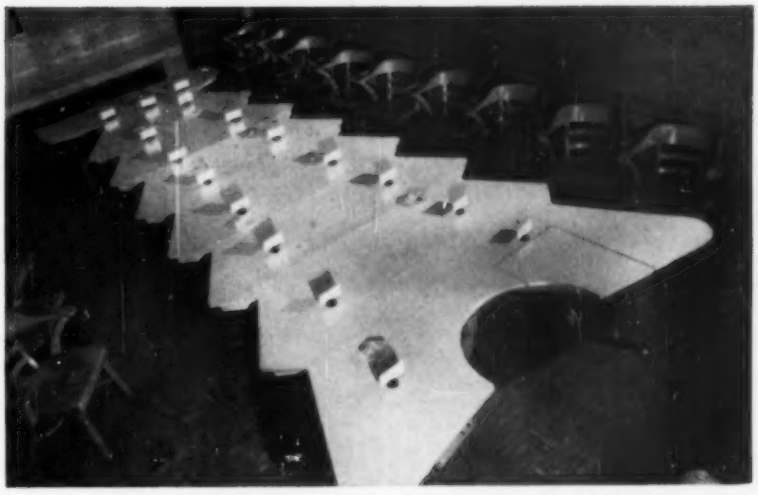
The investigating groups reported that fast driving, high mileage, heavy engine loading, air suction through loose connections, a faulty water pump, leakage of exhaust gas into coolant, or presence of foreign matter—such as poorly flushed radiator cleaner—would also lower the life of antifreeze and corrosion inhibitor.

They recommend cleaning the system once a year with a chemical cleaner and tightening all connections to keep the system sealed.—Nat Pet News, Aug 5, p81

Liquid-Honing Deburring

In only 45 min., liquid-honing deburrs and cleans rifled gun barrels for 90-mm. tank cannon at Oldsmobile Div., General Motors Corp. It also prepares the inner surface for chromium plating.

The liquid contains a mixture of 1 lb. of No. 145 silica grit and 2 lb. of No. 320 silica grit per gal. of water. A wetting agent and a rust inhibitor are also added to the solution. A spray nozzle blasts the inner barrel surface at a pressure of 100 lb. per sq. in. The nozzle moves into the barrel at 1½ ft. per min. and oscillates as it blasts. A water rinse at 5.17 ft. per min. follows grit blasting. Vapor Blast Co. made the equipment.—Iron Age, Aug 27, p102



Tree-Shaped Table for Training Sessions

Executives at Radio Corp. of America's Harrison, N. J., plant have come up with this conference table that looks something like a Christmas tree. Custom-built by Korda Industries, it has individual desklike sections with separate spotlights for use with films. —Business Wk, Aug 22, p128

Thyratron Locator Helps Spot Grounds

Spotting grounds on Detroit Edison Co.'s overhead system has been made easier by a new thyratron-tube ground locator. This equipment has been helpful in finding about 90% of the ground faults. It is easily adaptable to underground systems.

Essentially, the locator consists of a signal generator and a detector. The signal-generating equipment is carried in a panel truck modified to handle the size and weight of the associated power supply and protective equipment. The detection equipment is light enough to be carried by a linesman as he rides or walks along the faulted circuit.

Normally, Detroit's primary distribution system operates at 4,800 volts between phases. It is connected as a 3-phase undergrounded delta. When a ground appears on a substation bus, equipment at the substation determines which circuit is grounded. The ground locator truck is driven close to the feeding point of the grounded circuit.

On the trouble site, the locator's 5-kva. power supply is connected to the two undergrounded phases of the circuit, actuating the thyratron tube in the signal generator. One lead from the generator is hooked up to the grounded phase; the other is connected to a good ground, putting the signal on the line.

A linesman walking along the circuit carrying a loop-type detector hears the loudest signal at the point of fault.—Elec World, Sept 7, p92

Acrylonitrile Process

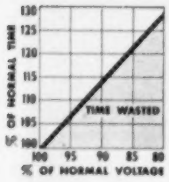
When American Cyanamid Co. begins operations at its new Avondale, La., plant next year, the price of acrylonitrile is expected to drop to 31¢ per lb. from the current price of 43¢.

The new process makes acetylene and ammonia from natural gas. The ammonia is reacted with methane to yield hydrogen cyanide. The cyanide and acetylene then form acrylonitrile.

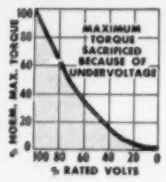
End uses for acrylonitrile include nitrile-type rubber and plastics, acrylic fibers, as a chemical intermediate, and in new plastics. The latter include acrylonitrile-styrene and acrylonitrile-styrene-butadiene copolymers.

The molecule of acrylonitrile, as a chemical intermediate, is unusual in that it has two strong points of reactivity that allow for chemical combination.—Oil & Gas J, Aug 3, p78

Low voltage causes this:



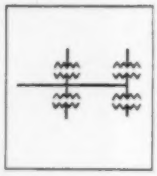
JOBS TAKE LONGER, heating and drying equipment doesn't perform well.



MOTORS OVERHEAT, burn out, don't provide full torque.

Here's what to do:

IF EXCESSIVE line drop is caused by too long feeders.



INSTALL Allis-Chalmers Unit Substations to keep voltage up.

How to Solve Low Voltage Problems

If you are losing production due to low voltage caused by excessive line voltage drop—because you've added new machines since your power distribution system was designed . . . or because production schedules have been changed—here's how to make sure voltage drop isn't costing you money.

Allis-Chalmers LCS Load Center Unit Substations can be installed at load centers to eliminate long runs of expensive, low-voltage cable. They are complete package units, easy to install.

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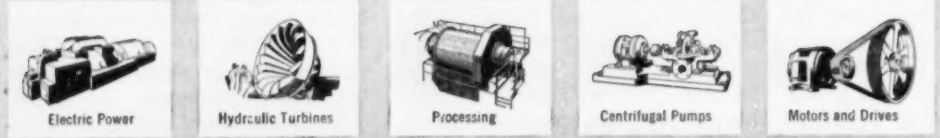
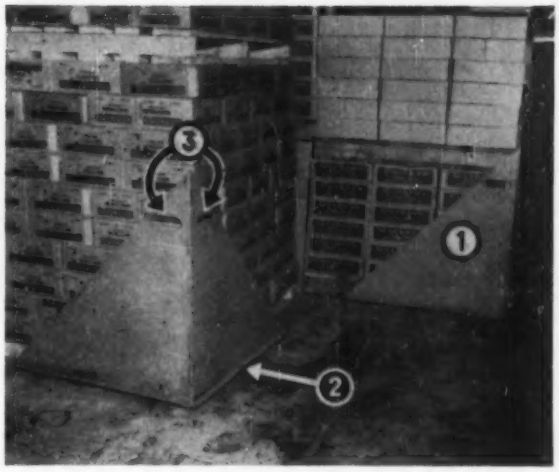


ALLIS-CHALMERS

This Month's How To . . .

. . . cut warehouse damage



To keep trucks from damaging stacks of palletized cartons in its warehouse, Gerber Products Co. devised these inexpensive corner guards of metal sheeting.

Fork trucks cutting close corners no longer break cartons or their valuable contents.

The guides are simple to make. Sheet metal is cut in isosceles triangles with sides approximately 2 ft. long. Sheet is then bent in the center at right angles, making triangular side plate (1). Next, bottom of each side is flanged (2) to provide a base. Hand holes (3) are then cut in the top on both sides.

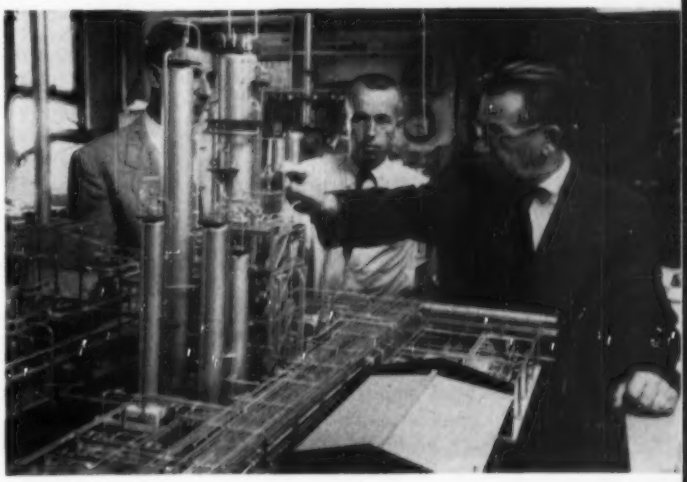
After painting, they stand out clearly, marking aisles and passageways for added safety.—Food Eng, Sept, p7

. . . train maintenance apprentices

Everybody at Hercules Powder Co.'s Parlin, N. J., plant helps to make training program work. The union makes sure that the task examination given by the foreman meets union standards and is a fair test of the trainee's ability. The trainee is responsible for passing five task exams every 6 months. He must also attend night school at least once a week, study at home, and keep his own training records.

Supervisors help train workers. Foremen also schedule jobs so that each trainee gets wide range of experience. The school keeps classroom material geared to specific plant needs.—Factory, Sept, p96

. . . simplify design with models

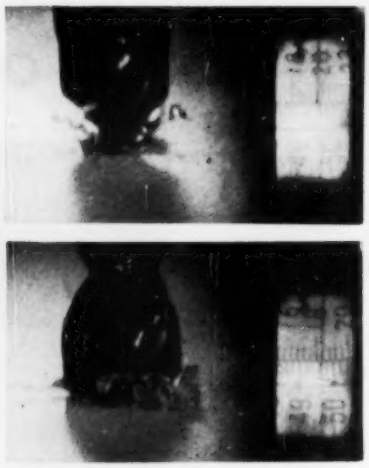


Modern design, particularly in chemical and power plants, has become so complicated that more and more engineering firms are turning to scale models to simplify drawing and interpreting of blueprints. An accurate model aids engineers in visualizing complicated networks of piping.

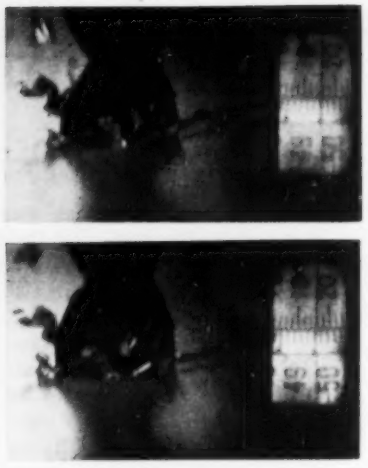
The model shown was built for Foster Wheeler Corp. by Atkins & Merrill, Inc., to help FW build a catalytic cracking unit for Empresa Colombiana de Petroleos, Columbia. Besides aiding design and construction, models can:

- Provide a convenient visual aid for training of operating crews.
- Explain technical aspects of a plant's operation to visitors.—Business Wk, Aug 22, p47

CAMERA helps search for cause of smashed aluminum rivets



DRILL DESIGN was aided by high-speed pictures showing drill entering metal and chip formation; timer (right) and neon tube fix speed



High-Speed Motion Pictures

. . . as a research tool can save time for your engineers in their study of machine design and production problems involving moving machinery

DESIGN of large, fast machinery introduces complex engineering and design problems. But Lockheed Aircraft Corp. has found that high-speed motion-picture photography, applied to the solving of these problems, can save hundreds of man-hours over "cut-and-try" methods.

"What is the difference," you may ask, "between conventional and high-speed motion pictures?" A conventional camera moves film one frame at a time past the aperture by an intermittent claw mechanism. A rotary shutter exposes each frame while it is stationary. Maximum speed is 200 to 250 frames per sec.

The high-speed camera pulls the film, by means of a sprocket, past the aperture in a continuous motion. Each image is recorded by a rotating prism traveling at the same speed as the film. This method permits speeds of 3,600 to 10,000 frames per sec.

Industrial application of high-speed motion pictures allows records to be made of operations or objects in full-scale operation that are too fast for the human eye to follow. The result can be analyzed picture by picture.

When Lockheed was faced by (1) an abnormal breakage of drills used to drill rivet holes in airplane skins and (2) bad burrs on the exit side, various new drills were made and photographed in action. The motion pictures showed the cutting action of the drill as it started to cut, chip formation, and the drill point emerging through the skin. Engineers then designed a drill that corrected both conditions.

Another problem was a high rejection rate on a machine making aluminum rivets from aluminum wire. Although the machine was apparently identical to other satisfactory machines, rivets came out smashed and misformed. High-speed motion pictures revealed that a spring was causing a pall to seat improperly on a rachet.

A flash-welding problem required Lockheed to resort to color film. The job was to preheat ends of two thin-walled steel tubes by a high-amperage current, push the ends together, and weld in the presence of a gas flow to avoid oxidation. But certain areas would not weld properly, and black-and-white motion pictures did not show the trouble. Color film, which could be used in this case because of the intense light generated during welding, showed that the trouble areas cooled too rapidly and prevented a homogeneous weld.

High-speed pictures also helped Lockheed engineers develop a new method of extruding aluminum by impact. The idea was to form a closed tube of uniform wall thickness by placing a round aluminum billet in a die and striking it with a punch. But the top part of the tube came out thicker than the rest of it.

Analyzing a film made of the operation showed too much slack in both plunger and die. At the moment of impact, the slack allowed the punch to slow down, causing excessive wall thickness at that point. So a new impact extrusion press was built.

Other applications at Lockheed have solved flight, ballistics and missile problems. Nearly every major problem solved by the camera has saved the initial cost of the equipment many times.—Iron Age, Aug 27, p97

Nitrophosphate Process Stabilizes with CO_2

A new nitrophosphate-fertilizer plant in Germany converts corrosive, unstable and hygroscopic calcium nitrate into calcium carbonate with carbon dioxide. Other processes either remove the calcium nitrate or tie it up as sulfate or phosphate by adding sulfuric acid, phosphoric acid, or potassium sulfate.

The new process was developed by the French firm, Potasse et Engrais Chemique. Advantages are:

- Wide range of fertilizer compositions can be made as no minimum nitrogen-phosphorus ratio must be maintained.
- Many corrosion troubles are avoided.
- Initial capital investment is lower than with other methods.
- Carbon dioxide is available as a waste product in integrated fertilizer plants that make their own ammonia.

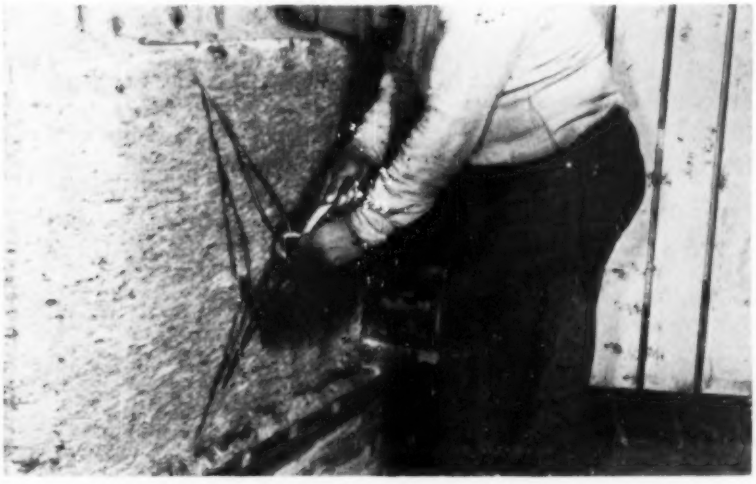
Sequence of operations is acidulation of phosphate rock with nitric acid, ammoniation and stabilization, granulation, drying, and screening. Before ammoniation, small quantities of certain metallic salts, containing magnesium or aluminum, are added to permit raising the pH to 9 or more without reversion to citrate-insoluble phosphates. The strongly alkaline ammoniated slurry can then be treated successfully with carbon dioxide.—Chem Eng, Aug, p115

Walk-In Blast Chamber Boon to Electric Motors

A large walk-in sand-blast chamber, used by Daystrom, Inc., of Archbald, Pa., has many features of interest to motor shop owners. For example, parts to be cleaned are wheeled into and out of the chamber on a railed dolly equipped with a ball-bearing turntable.

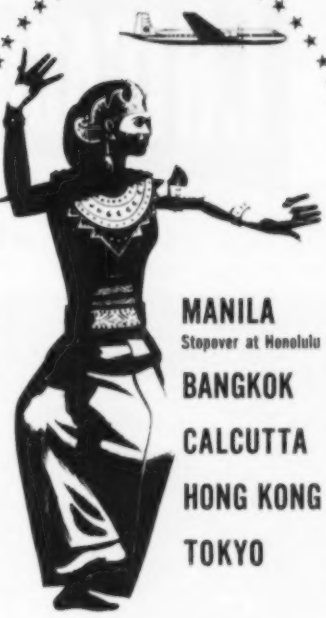
An overhead monorail works through a slit in the room that is sealed by stiff rubber flaps. Whenever a chain hoist moves along the rail, these flaps permit free movement of the chain.

Sand particles fall through a subway-grating floor and are caught in a salvage hopper for recirculation through the sand hose. Dust is sucked upward and out of the chamber by an exhaust system. Lighting is provided by vapor-proof fixtures. —Elec C & M, Sept, p137



Reusable Bands Cut Wool-Baling Costs

Raw-wool baling technique in which permanent bale bands and loops are used over and over has saved a Northern mill over $64,000 in direct labor, over $10,000 in material cost, and $25,000 in overhead expenses since its installation 2 yr. ago. Secret is a tandem bale press. Reusable manila-rope bands with small, disposable manila-rope joiners hold the bales together. Rope joiners are tied with a simple square knot. Operator who delivers bale for processing returns the manila bands to the baler for reuse. Loops are equally effective as flat steel bands. —Textile World, Sept, p173



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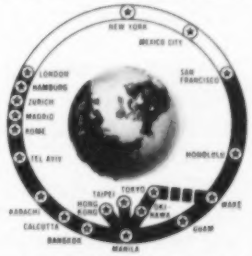

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CHICAGO "DOES IT AGAIN"

...now treats 900 MGD at West-Southwest

Treating sewage for the Chicago Metropolitan Area is big business. So big, in fact, that the West-Southwest Sewage Treatment Works is the largest activated sludge plant in the world. And this is but one of seven plants operated by The Sanitary District of Chicago.

Latest additions to the plant are the 24 Dorr Clarifiers shown in the right foreground of the photograph. These units (each 126′ dia.) are identical in type and design to the Dorr Clarifiers previously installed. Today, a total of 72 Dorr units at the West-Southwest Works have a combined average capacity of 900 MGD.

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Automatic Turntable Rejects Bad Resistors

Deposited carbon-resistor bodies are automatically sorted into three different 10% tolerance ranges, plus a reject group, by a motor-driven turntable arrangement used with a comparator bridge in the San Juan, Puerto Rico, plant of Radell Corp. This sorting is done after the ceramic bodies have been coated and fired, but before end terminal caps have been applied to the resistor.

The operator loads resistors into holes along the outer edge of the turntable as it rotates. A stationary disk about ½ in. below the table prevents resistors from dropping through. The turntable moves each resistor in turn between three sets of wiping contacts that bear against the resistor ends. The contacts are connected to the comparator bridge that allows the disk under the table to open and drop resistors that meet specifications.

If resistors pass all three stages, each with a different value, and are still outside tolerance, they are dropped into permanent reject holes.—Electronics, Sept, p266

Steam Drives Rock Drill

New type of steam-driven percussion drill, whose striking parts follow the bit down the hole, has just been put through tests in Texas. It drilled a 4½-in. hole through a 32-in. block of granite in 3 min., 35 sec.—a rate of 45 ft. per hr.

The drill is something like a miniature double-acting pile hammer, about 5 ft. long and less than 4-in. in dia. Inside it is a free piston, with heads on each end, that operates on a 4-in. stroke and delivers up to 3,000 blows per min.

The device is threaded on the bottom of a string of 3-in. drill pipe, through which steam is fed to it. Exhaust steam escapes through a blow hole in the center of the bit to carry away cuttings. It takes about 2,400 lb. of steam per hr. at a sustained pressure of 400 lb. per sq. in. to operate the 4½-in. drill.

Bassinger Tool Corp., San Antonio, Texas, developed the new drill.—Const Meth & Equip, Sept, p135

Transmitter Makers Get Ready for Color

Both Radio Corp. of America and General Electric Co. have said that color television broadcast equipment, compatible with present black and white receivers, will be ready by early 1954.

RCA reports that orders for custom equipment have been coming in at a good rate in spite of the fact that present prices could be two or three times higher than those for later quantity-production models. Most of the orders so far received are for film or slide operation rather than the less expensive network-rebroadcast equipment.

GE, in a statement to district sales managers, listed its equipment in three phases: network, slide-film, and studio.

Network equipment for rebroadcasting only will cost about $13,800 and will be available in the first quarter of 1954.

For slide-film transmission, GE divides its equipment into three classes. To originate slide programs equipment will cost $39,500; for 16-mm. projection only, $49,500; combination—$68,500.

For originating color programs, the studio camera channel and associate switching equipment will be around $69,500 and will not be available until late 1954.—Electronics, Aug, p8

Functional Layout Gives Efficient Production

Flow-line layout gets so much publicity that many plant engineers plan for it without considering all aspects of their production job. But this was not so at National Cash Register Co. (Manufacturing) Ltd.'s new 260,000-sq. ft. plant at Dundee, Scotland.

The engineers there adopted the older-type functional layout to produce large numbers of components for a wide variety of business machines. The layout provides (1) flexibility for meeting product design changes, (2) economical machine loading, (3) efficient use of operators. And it permits close supervision.

But the company has not adhered rigidly to grouping of machines by type. Part of the steel-cabinet production forms a flow line. Spot welders have been placed in the center of the press section so cabinet sides can be tack-welded as they come off the press.

Straight-line production has been adopted in the enameling shop too. Cabinets and similar parts are conveyed on an overhead chain conveyor to spraying and then on through a drying oven.—Mach, Aug 1, p1237

ZnO Strengthens Glass

Zinc oxide added to glass lowers its coefficient of expansion, increases its tensile strength, and improves its chemical durability. Substituting zinc oxide for part of the silica in soda-lime-silica base glass increases the density in almost a straight-line relationship with the amount of zinc oxide added up to 16 to 18%.

In optical glasses, zinc oxide is valuable in reducing the tendency to crystallize on cooling. It is similar to barium oxide in its effect on optical behavior and imparts greater chemical stability. Zinc oxide is also often added to barium flint and barium crown glasses.—Ceramic Ind, Sept, p83

What Aviation May Do in the Next 25 Years

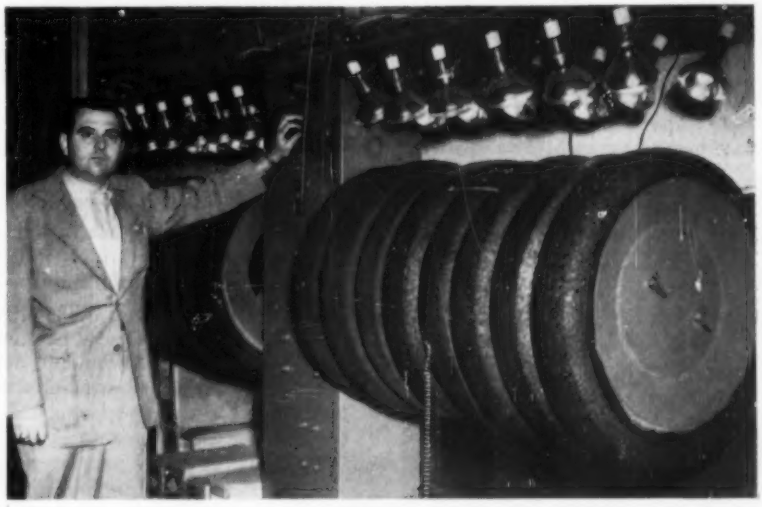
The Wright Brothers made their famous first airplane flight 50 years ago at Kitty Hawk. Now, let's take a look at what may happen in aviation in the next 25 yr.

• **Jet-engine Transports**—Their use will expand when they can compete economically with propeller-driven aircraft. That may be at cruising speeds of 500 miles per hr. —175 miles per hr. faster than the cruising speed of present transports. Expected speeds are 500 by 1960 and 600 by 1970.

• **Helicopters**—Commercial use appears unlimited for carrying people from city to airport and between communities. But don't expect it to replace the automobile.

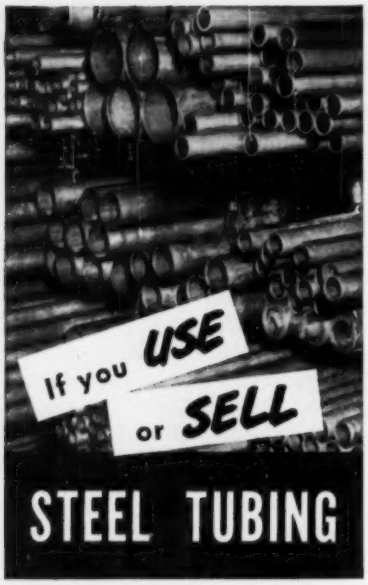
• **Atomic Power**—The outstanding development will probably be atomic-power plants for aircraft. Lots of problems must be solved, including the heavy, extensive shielding around reactors.

• **Rockets**—All signs indicate that, with improvement in chemical fuels, rocket transportation will be possible within the next 25 yr. Rockets will operate in the upper atmosphere, but practical competition with conventional aircraft is doubtful.—Prod Eng, Sept, p197



Infrared Dries Tires for Recapping

Two double banks of infrared lamps dry moisture from these sixteen tires at the same time. Cylinders holding tires revolve slowly, exposing entire surface. Monthly production of machine runs to 500 tires at 375 kw.-hr. This installation has 24 lamps of 250 w. each. Average for drying is ¾ kw.-hr. per tire.—Elec World, July 27, p130



in considerable volume, you may profitably make it yourself from coiled strip on a small, compact Yoder electric-weld tube mill. Daily production from 25,000 to 50,000 feet with only one operator and a helper. Amazingly simple and trouble-free, the new 4-in-1 Yoder welding transformer insures highest output of quality tubes at lowest cost per foot or mile.

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Electric Weld
TUBE MILLS

Resistance-Weld Quality

Welds can be controlled by statistical means to get a consistently high quality level, not just spot welds good enough to meet minimum requirements

MANY VARIABLES affect resistance welding. And most of them can damage seriously the strength and metallurgical quality of the welded product. Consolidated Vultee Aircraft Corp. controls such variables by statistical quality control.

To control quality of spot welds in production, three-spot test specimens are tested in shear for each of the following conditions:

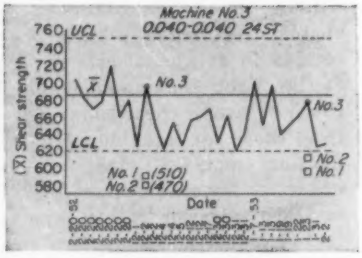
- For a production run of more than 1 hr., a test specimen is made at intervals not exceeding an hour on each machine being used.
- For a production run of 1 hr. or less, a test specimen is made for each change in kinds or gages of materials for any machine.
- When control settings or electrodes of any machine are changed, a test specimen is made.

A macroscopic inspection of three consecutive spot welds is made when materials or gages are changed or every 2 hr. in a run.

When a test specimen fails to meet minimum requirements, the machine is taken out of production immediately and necessary adjustments or repairs are made. All settings may be varied by ±5% from established values or by 10% when only one setting is adjusted. Before production can be resumed, 26 acceptable test specimens must be made; 21 are tested in shear and 5 are sectioned and etched for macroscopic examination.

If control limits of any machine must be exceeded, two three-spot test specimens are made. The machine is allowed to continue in production if the specimens meet these three requirements:

1. Shear strength average must not exceed either upper or lower control limits by more than 50% of the difference between minimum strength requirements and the value established as the lower control limit on the statistical-quality-control graph.
2. Shear-strength range shall not exceed the upper control limit by more than the value established as the upper control limit plus the average value.
3. Percentage of variation must not exceed 35%.



Let's look at an actual example, as shown on the chart for machine No. 3 welding 0.040-in. to 0.040-in 24S-T aluminum-alloy sheets. On December 2, the shear-test average fell below the lower control limit by more than 50% of the difference between the minimum strength requirements and the lower control limit.

This value of 510, labeled No. 1, is enclosed in a square in line with the December 2 date. Setting weld time and postheat at 52 milliseconds, instead of the original 36 milliseconds, gave the reading at No. 2—still too low. The maintenance crew then replaced the upper electrode, cleaned contact points, and allowed the welder to fire continuously for about 2 hr. A third test specimen (No. 3) gave an acceptable average.

The shear-test average on January 25 was out of control but within the 50% difference between minimum strength requirements and the lower control limit. But the operator was not satisfied with the low readings, as shown by Nos. 1 and 2 tests. Inspection of the machine showed the water tube not quite full. A third test, pulled after water-line adjustment and at the same settings as tests Nos. 1 and 2, gave the No. 3 reading, well within control limits.—Weld Eng, Sept, p48

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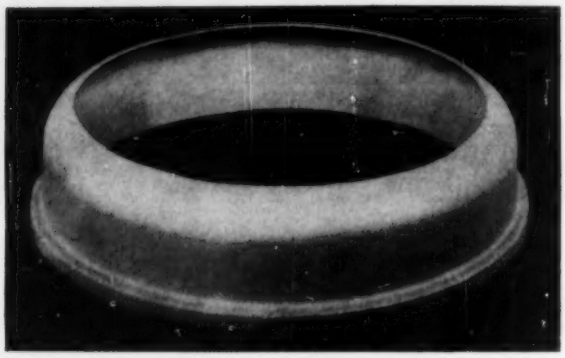

THIN-WALLED stainless-steel cylinder shows accuracy possible. Tolerance on 12-in. dia. is ± 0.030 in.

FROM PATTERN (left), core shell and cutaway outer shell (center) are made to cast piece (right).

Shell-Molding Stainless Steel

Shell molding has had a lot of publicity, but little information has been given to the design engineer. If he is to produce successful designs, he must be familiar with design factors of shell-cast parts

CASTING STAINLESS STEEL and the so-called super alloys in shell molds has three major advantages:

1. It permits greater latitude in designing castings and using them where they were previously considered unfeasible.
2. It often permits reducing the cost of the finished part.
3. It improves the performance of the casting.

Solar Aircraft Co. also found other advantages in the process. Mold walls are so smooth that castings can be run twice as long as in baked sand. Solar made one alloy-steel section 8 in. wide by $\frac{3}{16}$ in. thick to a length of 60 in. Another alloy part of 0.062-in. section and 4-in. width was run to 12 in.

The combination of greater length and thinner section allows casting of intricate shapes. It is now practical to design sections of $\frac{1}{16}$- to $\frac{1}{8}$-in. thickness in relatively large sizes for use in the as-cast condition.

Cost savings made by shell molding can be appreciable because it reduces or eliminates machining. The design engineer must consider this point and obtain cost figures on finished parts, not on parts as cast, because the initial cost of shell molding may be higher. Finished-part cost may also be lower because of the better surface finish obtained with shell casting.

Another factor the engineer must watch in selecting a casting method is the dimensional accuracy obtainable. With almost any stainless alloy, parts can be shell-cast with a $\frac{1}{4}$-in. section held to tolerances of ± 0.002 in. This tolerance is better than can be expected from dry-sand molding and approaches the tolerances of investment casting. Solar is holding $2\frac{1}{2}$-in. sections to ±0.010 in. and the diameter of a 12-in. thin-walled cylinder to ± 0.030 in.

Accuracy and uniformity of castings depend to a considerable extent on the variables in the molding method and patterns. Principal variables are: shell molding—pattern temperature, pouring temperature, and the resin-sand mixture; sand molding—wood-pattern instability, operator's skill, ramming techniques, pattern removal, drying cycle, sand, mold assembly technique, core painting, and metal pouring temperature; investment casting — wax-mold temperature, wax temperature during molding, handling of wax pattern, composition of wax and investment material, drying and firing cycle, and metal and mold temperature at pouring.

Shell molding offers another outstanding advantage to the design engineer. Few built-in stresses are set up by the shell molding technique. Mold collapsibility is better than in alternate methods, thereby resulting in less restraint on the casting as it solidifies and fewer stresses.

In shell molding, collapsibility can be controlled fairly closely. The plastic bond in the shell burns away shortly after pouring; the casting itself builds up a skin of solidified metal that holds the shape of the casting. Varying the plastic content of the shell regulates the burning time. Thus, the ready collapse of the shell at a lower pressure and a higher metal temperature than those common in a sand mold results in less stress in the casting.

Shell castings also are less likely to have sand inclusions than are sand castings. Shell molds are stronger and erode less. But shell molds are subject to some sand inclusions, while investment castings, being made of hard ceramic, are not. Ceramic inclusions in invest-

ment castings, however, are just as injurious to the quality of the castings.

Important to the engineer too is the small, uniform grain size inherent in shell castings. The rapid solidification refines grain size and improves physical properties. Thus, for thin-walled castings to be used in high-pressure service, the engineer can turn to shell casting as they are less likely to leak as a result of intergranular porosity.

In designing castings for shell molding, the engineer must consider the characteristics already mentioned plus these important factors:

- **Stresses** must be considered in the range between 1500 and 2600° F. (solidification temperature). No cracks, distortions, or breaks should develop while parts cool through this temperature range.
- **Freezing characteristics** of molten metal must be kept in mind. Since castings solidify from the outside in, shrinkage may cause trouble. If there are isolated areas of heavy mass, they may become disconnected from the flow of liquid metal before they are sound, thereby resulting in voids.
- **Stresses** caused by uneven cooling can cause a casting to fracture or distort in the higher temperature ranges. Care should be taken to equalize these stresses as much as possible.
- **Sharp reentrant angles** produce areas of stress concentration. They develop a notch effect in the casting and cracking becomes difficult to prevent.
- **Sudden changes** of mass should be avoided by generous use of tapered sections.
- **Large flat areas** of thin wall should be avoided because they will not stay flat and "oil canning" will result.
- **Small holes** tend to complicate the foundry problem if they are cast in. Usually they are cheaper to drill or machine.
- **One surface** on the heaviest section of the casting machined lets the foundryman use this area for risers.
- **The parting plane,** wherever possible, should permit the foundryman to pour in a vertical position. From a cost standpoint, the parting plane should be restricted to a single plane.

Fabricating-Process Comparisons

Factor	Investment Casting versus Shell Molding	Dry-Sand Molding versus Shell Molding	Precision Forgings versus Shell Molding	Welded Assemblies versus Shell Molding	Machined Parts versus Shell Molding
	(Preferred method tested according to factor)				
Over-all Cost	Shell	Dry Sand	Forgings	Shell	Shell
Degree of Complexity	Investment	Shell	Shell	Same	Shell
Tooling Cost	Shell	Dry Sand	Shell	Welding	Hard to compare
For Large Parts	Shell	Dry Sand	Forgings	Welding	Machining
For Small Parts	Investment	Shell	Shell	Same	Machining
Tool & Pattern Life	Same	Shell	Shell	Welding	Machining
Accuracy & Finish	Investment	Shell	Shell	Same	Machining
Intricacy	Investment	Shell	Shell	Shell	Machining
Time for First Sample	Shell	Dry Sand	Same	Welding	Machining
Dimensional Stability	Same	Same	Shell	Shell	Hard to compare
Stress Distribution	Shell	Shell	Shell	Shell	Cannot compare

One thing the design engineer should remember if he wants to avoid a lot of production trouble is that shell molding should not and cannot be applied to all jobs. The method has its limitations, and they should be recognized.

The principal limitation in comparison to sand molding has to do with patterns. In the design of extremely thin parts, shells must be made in two parts to get enough mass to heat the resin-sand mixture and make the resin plastic. Therefore, the pattern can have no thin projecting areas with insufficient mass and heat content.

Multiple-piece, loose-part patterns are not practical in shell molding. In sand molding, patterns can be made from many pieces of wood fastened by pins and removed separately after the sand has been rammed; this method permits casting of complex shapes, such as undercuts and back drafts.

But too much heat is lost in shell molding, while the pattern is being disassembled and reassembled for the next operation. The temperature change at critical points in the mold causes variations in shell thickness.

Also, shell patterns must be extremely accurate, so unless all pattern parts are held at the same temperature, pattern assembly would be difficult or impossible. Accuracy of the final casting would suffer as a result of uneven heat, and the patterns at 500°F. would be too hot to handle, except with bulky asbestos gloves. Mechanized handling is possible but would be expensive. The resin from the shell also would seep into the pattern, bond the parts together, and make assembly and disassembly slow and difficult.

A shell pattern should be made of as few parts as possible. For intricate parts, a number of separate shells can be made from separate patterns and assembled into the complete mold.

Undercuts or backdrafts can be cast with multiple shells. Draft in shell molding may be reduced from the normal 3° to ¼°; this may allow use of as-cast surfaces without machining as reduction to ¼° adds only 0.0044 in. per in. of thickness—possibly within the specified tolerance.—Prod Eng, Sept, p129

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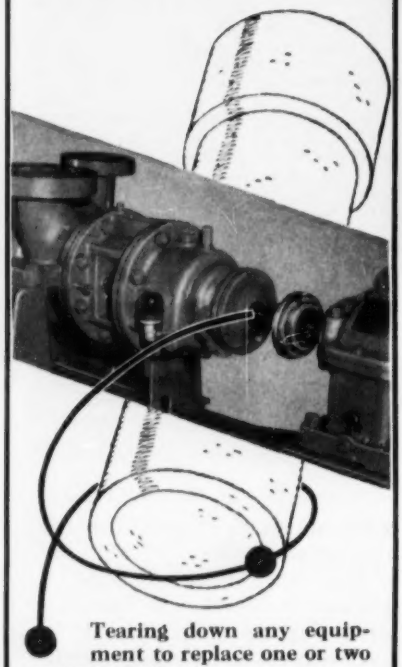

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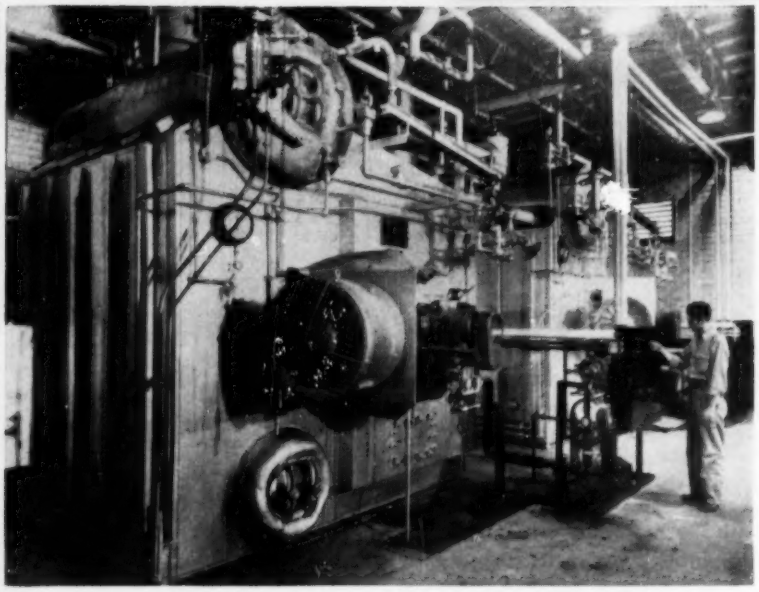


THE PACKAGED BOILER is neat, compact, and quickly assembled

Picking Packaged Boilers

Consider everything before you buy and make sure you get what you need. Should operation be automatic or not? And what about auxiliaries and construction?

FULLY INTEGRATED, plant-assembled, packaged, water-tube steam generators have been getting more popular since the end of World War II. They are compact and easily serviced and can hook in quickly to existing systems; they can operate either manually, automatically, or semiautomatically.

But for industrial installations a qualified operating engineer is practically mandatory. Controls cannot take the place of a competent engineer. They are meant to give efficient operation at minimum cost under various load conditions. Even though package units carry automatic devices to start, purge, recycle with automatic restart, you still need a good operator.

Here are some questions and answers to help you decide whether you should use automatic or semiautomatic control.

Q 1. Is there a heating load needing operating pressure at 15 lb. per sq. in. gage or lower on week ends with no engineer in attendance?

A: Yes. (Fully automatic.)

Q 2. Will wide operating range (about 8 to 1) prove best?

A: Yes. (Semiautomatic.)

Q 3. Is an engineer in attendance?

A: Yes. (Semiautomatic.)

Q 4. Will peak boiler load reach or go above 20,000 lb. per hr.?

A: Yes. (Semiautomatic.)

Q 5. Would it pay to avoid boiler shutdown through burner accident or fouled tips by having more than one burner?

A: Yes. (Semiautomatic.)

Q 6. Is load a representative industrial one—that is, above 15 lb. per sq. in. gage?

A: Yes. (Semiautomatic.)

Q 7. Is load intermittent, with periods of little or no steam requirements and with maximum capacity below 20,000 lb. per hr. with boiler room left unattended for considerable periods?

A: Yes. (Fully automatic.)

Here are a few tips about auxiliaries and construction. Refractory insulation should be top grade. Ask supplier for detailed list of

materials for each specific wall of the boiler.

Forced-draft fans should have reasonable safety factors and overload capacities. Look for type designation of fan, motor rating, volume, and static-pressure data to guard against large connected motor loads, excessive draft losses.

Valves, fittings, and trim cannot all be the same material. See that the boiler manufacturer states size, type, catalog number, and manufacturer when listing valves. Thus you avoid bronze or cast-iron selections where their service may be questionable, as in the feedwater line.

Check soot blowers closely so you know whether you are getting valve-in-hand or revolving designs. See, too, that soot-blower head material, cast iron or steel, is definitely specified.

Instruments and panels can stand a word of caution. Be sure you get the basic instruments of draft gage, steam flowmeter, flue-gas temperature indicator, and steam-pressure, inlet-fuel-pressure and temperature gages. Study all extras fairly closely as to whether their advantages outweigh maintenance cost.—Power, Sept, p77

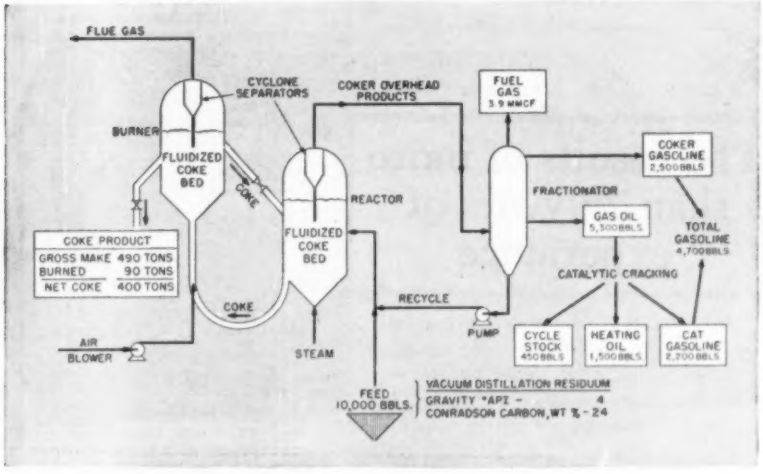
High-Voltage Jolt Cracks Nuts Fast

Eighteen electric nut crackers have replaced conventional crusher-type machines formerly used by Northwest Nut Growers, Portland, Ore. The company reports that improved-quality nut meats are turned out faster by the electric units.

Operating at approximately one-third speed, the machines crack 1,200 lb. of nuts hourly. Because of this better performance a crew of 60 is assigned to sorting and packing, compared to the 100 needed previously.

In the new operation, nuts are fed from storage hoppers onto long helical screws that deliver nuts at quick-timed intervals to the cracking electrodes. These electrodes catch each nut as it falls from the screw, and at the same instant an electrical impulse shatters its shell.

Power is supplied by a 60-hp., 220-volt motor-generator set. Transformers step up the voltage to 65,000 volts, 5,000 amp. This current charges 48 capacitors. A spinning-rotor distributor, synchronized with the feed screws, times the electric shock.—Food Eng, Sept, p218



Fluid Coking Is Continuous Process

Fluid coking, after 4 years of research by Standard Oil Development Co., is ready to go to work in three units to be built in the U. S. This new process adapts fluidized-solids technique to thermal cracking of heavy fuels. Feed is introduced to the coker reactor. Cracked fractions are drawn off overhead through the cyclone separator for conventional fractionation. Coke-bed temperature ranges from 950 to 1050° F. Coke particles are continuously withdrawn and lifted to the burner by adding combustion air. Advantages of process include continuous operation, elimination of mechanical removal of coke, handling of heavy pitch from vacuum tower without further preheating, and attractive yields.—Oil & Gas J, Aug 17, p74

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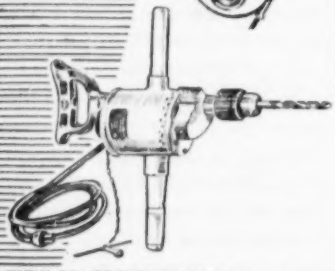

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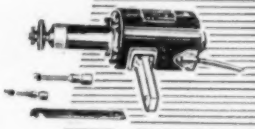

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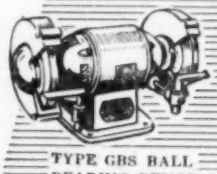

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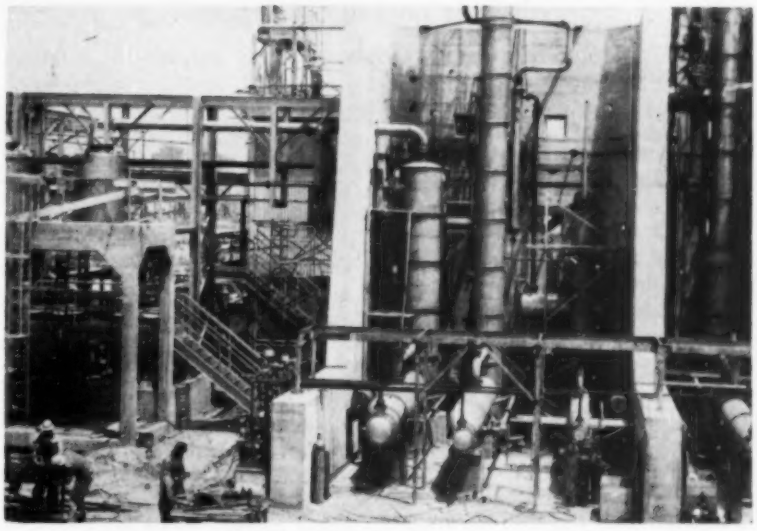
TECHNICAL SHORTS

Better Than Transistor?—Development of a new magnetic decision element that may be superior to the transistor or vacuum tube in the 0 to 200-kc. range and applicable to most weapon computers was announced recently by the U. S. Naval Ordnance Laboratory—Electronics, Sept, p26

Nylon Drives Auto—Packard Motor Car Co. announced the first all-nylon gear train will be part of their new Ultramatic Drive transmission. Almost 4 years of research and development are behind the innovation.—Mod Plastics, Sept, p115

Well Grounded—Ford Motor Co.'s new plant in Oakville, Canada, has a heavy, 6,000-ft.-long copper cable circling the assembly building underground. Smaller cables branch from it and are welded to the base of each steel column and piping system to ground all electrical leaks and static electricity. —Am Mach, Aug 3, p153



Commercial-Scale Hydrazine Production

First to make hydrazine in large quantities is Mathieson Chemical Co.'s new $3-million Lake Charles (La.) plant. It will employ a modified Raschig process in which chlorine and caustic form sodium hypochlorite. The hypochlorite reacts with ammonia to form chloramine, which with more ammonia is converted to hydrazine liquor. Azeotropic distillation then gives anhydrous hydrazine. Uses include rocket fuel, an antituberculosis drug, soldering fluxes.—Chem Wk, July 18, p42

Just Heat and Eat

Aluminum packs mean hot meals for pilots and crews in flights at Wright-Patterson Air Force Base, Ohio. Resistance elements fitted on bottom of the sliding trays heat the smaller sealed aluminum containers holding food in separate portions. In 30 min., oven completely cooks meals that are then ready to serve on the tray. Foil packs are a product of Reynolds Metals Co., Richmond, Va.—Food Eng, Sept, p216

Polishes Steel—MacDermid, Inc., Waterbury, Conn., has developed a room-temperature chemical polish that gives steel a brilliant luster. A 1-min. immersion produces a luster equivalent to a 30-min. bright-nickel deposit. It also reduces surface roughness and deburrs sharp edges.—Prod Eng, Sept, p9

Saves the Trees—New Brunswick, Canada, has completed the largest aerial spraying operation ever undertaken. Seventy-seven airplanes sprayed 1½-million acres with 1-million gal. of DDT solution in a month-long fight against spruce budworm.—Paper Ind, Aug, p541

What Makes Rum Good—The Puerto Rican government wants to find out too, so it is financing a $500,000 pilot plant at University of Puerto Rico for research into rum fermentation and distillation. Then it will pass the data on to distillers.—Chem Eng, Aug, p124

For New Fabrics—New yarn-manufacturing technique developed by E. I. du Pont de Nemours & Co., Inc., provides for controlled looping of individual yarn filaments in filament yarns of all types. Experimental results obtained so far show such "textured" yarn adds bulk, covering power, and dryness of hand to woven and knitted fabrics, and approaches somewhat the hand of spun-yarn fabrics.—Textile World, Aug, p240

Largest Soundproof Structure—Sound-testing building is under construction at General Electric Co.'s plant, Pittsfield, Mass. The new building will be largest soundproof, echoproof structure in the world. The four-story building will have walls 4½ ft. thick, made of concrete, Fiberglas, masonry, copper shielding, and, on the inside, Fiberglas wedges and wire mesh.—Am Business, Aug, p6

Nine Ways To Save Postage

Don't let your mailing expenses eat into your profits. There are ways to cut your mail-handling costs. All you have to do is set up a system and then stay close to your country's postal regulations

YOUR GOVERNMENT controls postal rates. But you control your system for handling your mail. You can get economy, regardless of rates, by using the proper class of mail for mailing pieces as well as by using judgment in controlling the items scheduled for mail handling. These nine ways can help you get the most out of your system.

1. Centralize handling of all mail—The first step in control of postage expense is to fix the responsibility for determining the class of mail to be used and the amount of postage to be paid for each item. This is most easily done when all mail, both incoming and outgoing, is handled in one place in small as well as large offices.

2. Use the proper postage amount in order to save penalty and delay—Mistakes in handling mail can usually be buried, and they come to management's attention only by an unfavorable comparison of postage expense between periods. Carelessness in respect to checking the correct amount of postage can be costly. A mailing manual, directing the attention of the responsible person to the every-day means of postage expense reduction, will usually accomplish the objective of control.

3. Mechanize mailing operations to the fullest extent—The larger the volume of mail, the greater can be the utilization of machine methods. Metered mail is recommended for the control of postage. The minimum equipment would include postal scales, mechanical postage affixer, and mechanical letter opener. From this modest basis, a fully equipped mailroom can be developed.

4. Control personal use of company postage—If there is to be any sincere effort to control, as well as reduce, postal expense, there must be a definition of policy where company postage for personal affairs is concerned. Employees must know what the company's position is on personal use of company postage.

5. Use lighter-weight paper and envelopes—Paper grade can be maintained and weight can be reduced so that either:

- More correspondence can be included in one envelope.
- Or less postage is required for mailing multiple-page correspondence.

Lightweight paper and envelopes are even more important when using airmail or air letters to foreign countries.

6. Check airplane schedules before using airmail—This suggestion has two aspects:

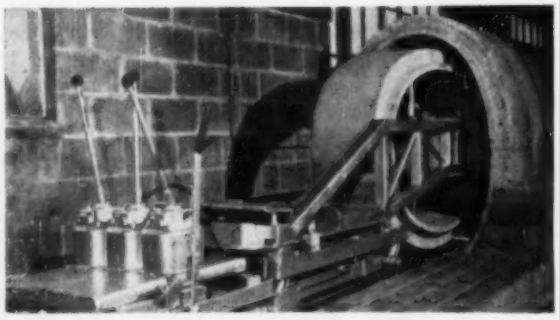
- Determine if the city to which the mail is being directed is located on an air route.
- Check airplane schedules during storms and inclement weather to see if there has been any grounding.

7. Study all classes of mail and their uses—Handling mailing matter requires study and knowledge for the most economical use of the various classes of mail. Most governments publish guides to proper mail handling. Study them and make certain you are adhering to your government's regulations.

8. Collect mail for same address in one envelope—Majority of mailing pieces that go first class weigh less than an ounce. If they can be accumulated and included in one envelope, advantage can be taken of weight requirements.

9. Study correspondence and reduce the number and length of letters—The most effective measure for reducing postage expense goes beyond the physical handling of mailing matter and attacks the problem at its source: the place where correspondence and mailing matter originate.

Companies that have studied the cost of writing a business letter, and then followed up these studies by intensive training in business-letter writing, have had the best results.—Am Business, Aug, p14



Progressive Tunneling Without Liner Plates

Relatively new method of sewer construction at Bay City, Mich., required no tunnel liner or roof bracing. Short sections of elliptical pipe were passed through previously laid pipe, rotated, and pulled back into final position by a special pipe-laying rig. In the pictures above, battery-operated pipe-layer moves elliptical pipe section through previously installed line (left) until it emerges at the heading (right). There it is rotated by hand, first vertically and then horizontally, and pulled back into final position by the pipe-layer. Lamar Pipe and Tile Co., Saginaw, Mich., developed the method and are sucessfully applying it.—Eng News-Rec, Sept 10, p55

Scouring Powder Carves New Chemical Market

Introduction of a "new" Old Dutch cleanser by Cudahy Packing Co. has jarred the household-scouring-powder business. The new formulation, backed by a strong promotional campaign, seems to be the start of a battle to climb back into top sales position.

The cleanser now contains chemical additives that are claimed to sanitize and deodorize. Ingredients as shown on the label include: 93.65% inert cleansing components (which include abrasive and perfume); 2% dodecyl benzene sodium sulfonate; 0.85% nonyl benzene sodium sulfonate; 0.5% sodium perborate; and 3% trisodium phosphate.

Also added is a dye that turns Old Dutch yellow in water. It tells the housewife when the cleanser is thoroughly rinsed off. —Chem Wk, Aug 1, p34

Makes Sheepsfoot Roller

"Why buy $8,000 worth of equipment when you can make it yourself for $3,500?" So C. F. Replogle Co., road contracting firm in Ohio, built this sheepsfoot roller from ½-in. steel plate. Construction is all-welded. For longer life each tooth was hard-surfaced by four manual rod passes. Teeth were flame-cut from ½-in. angles. They were then fabricated by welding angles together.—Const Meth & Equip, Sept, p63

Factors To Be Considered When Blending Synthetics

Minimum percentages of nylon Orlon, or Dacron to blend with rayon, acetate, wool, or cotton cannot be firmly set because there are so many other variables. But certain principles can be followed, and detailed tests under controlled conditions reveal this basic information:

- Minimum percentages vary greatly with the other fiber in the blend.
- Degree of the functional property desired causes the minimum percentage to vary.
- Inclusion of the correct minimum or even higher percentages does not guarantee performance at a given level.
- Optimum fabric design and finishing may lower the indicated minimum fiber content for an acceptable level of a functional property such as wrinkle resistance.—Textile World, Sept, p266

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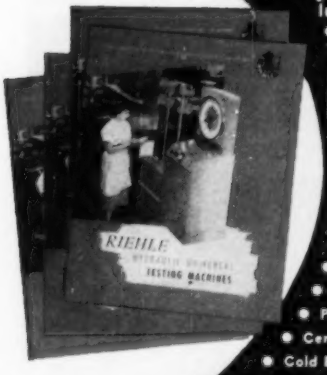

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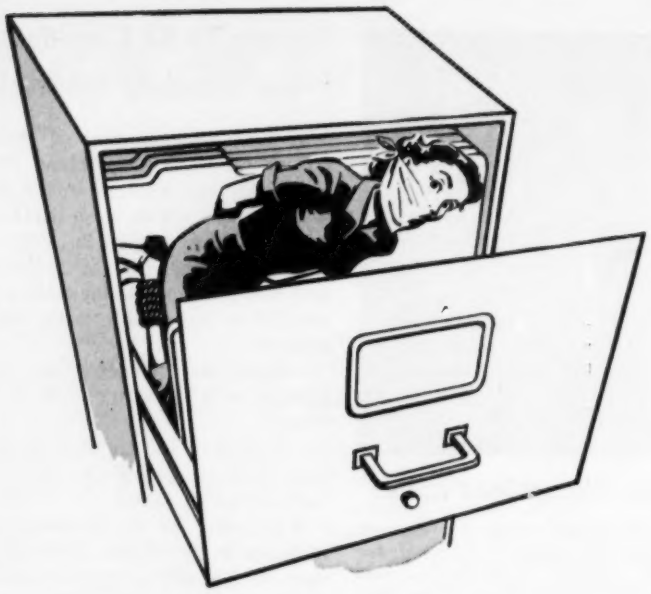

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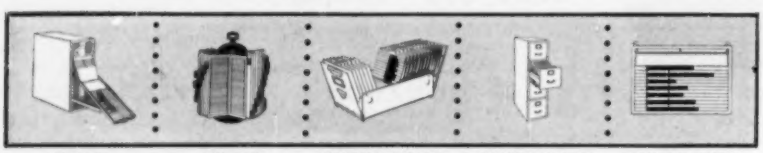


KARDEX LINEDEX VERTICAL VISIBLE FILING CABINETS SCHED-U-GRAPH

Ladle Additions Improve Casting Machinability

Most high-volume users of iron castings have required maximum phosphorus of 0.35% or less for good machinability. But tests made at Carborundum Co. reveal that high-phosphorus irons, when suitably treated, have excellent machining characteristics.

The machinability tests were: (1) tool-wear turning tests on individually cast rings, (2) constant-pressure turning tests on arbitration bars, (3) drill-penetration tests on small rectangular bars, and (4) tapping-energy tests on small locknut castings.

Tests were made on high-phosphorus iron with and without ladle additions of Ferro Carbo briquettes. Results: less tool wear and better machinability for the treated irons.

Tool-wear test results, for example, were plotted directly as tool-flank wear against the number of rings cut for each at three speeds. From these graphs, metal volume removed was calculated for tool wear of 0.010 and 0.020 in. and plotted against cutting speed.

For untreated irons, metal volumes were 3, 5.8, and 30 cu. in. for speeds of 500, 300, and 180 ft. per min. Corresponding volumes for treated irons were 6.5, 17, and 48 cu. in.—Am Mach, Aug 31, p92

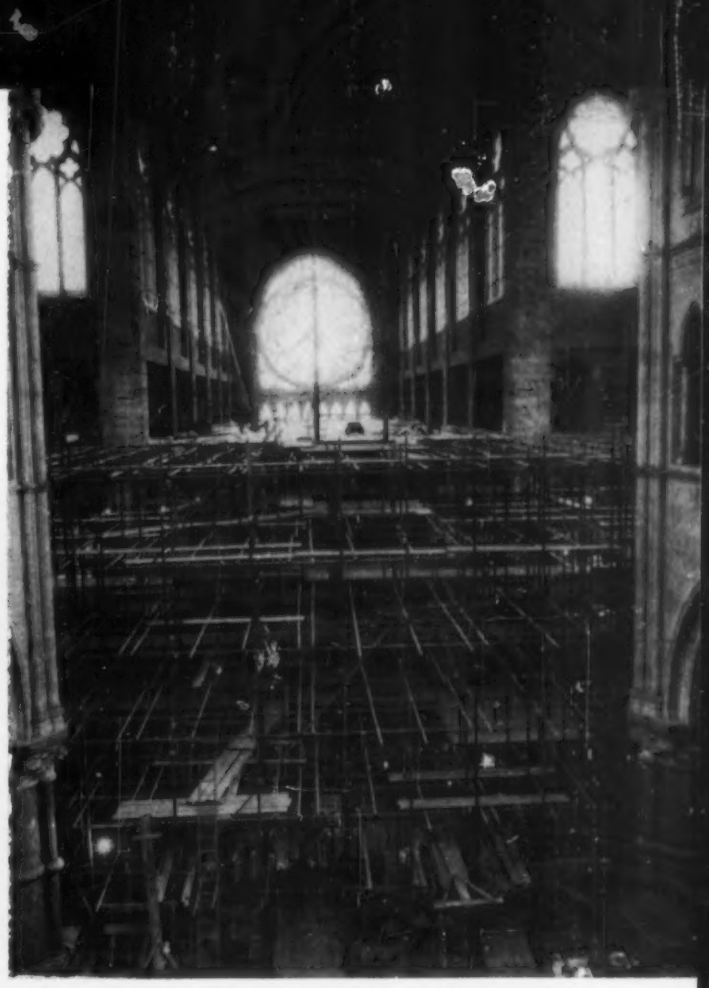
Handles Polished Parts

Nicks and scratches on ground bearing rollers were a problem at Timken Roller Bearing Co. until a new way to transfer rollers to a receiving tray was installed. A flexible tube, with a leather-encased end to protect the rollers, delivers rollers from the grinder to the tray. A gear mechanism rotates the tube in a circle around the bottom of the tray.—Factory, Sept, p111

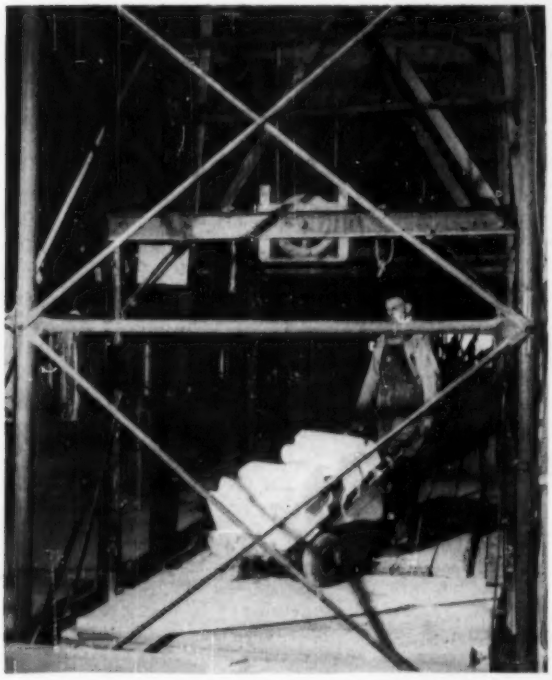
Scaffold Supports Stone

STONE-FACED ARCHES form part of the interiors of many churches and halls. Putting the heavy facing stone into place requires skill and, when arches are high up a wall, an expert scaffolding technique also is required.

Pictures show how George A. Fuller Co. put up Patent Scaffolding Co.'s TubeLox to support stone for facing the Cathedral of the Sacred Heart in Newark, N. J.—Const Meth & Equip, Sept, p60



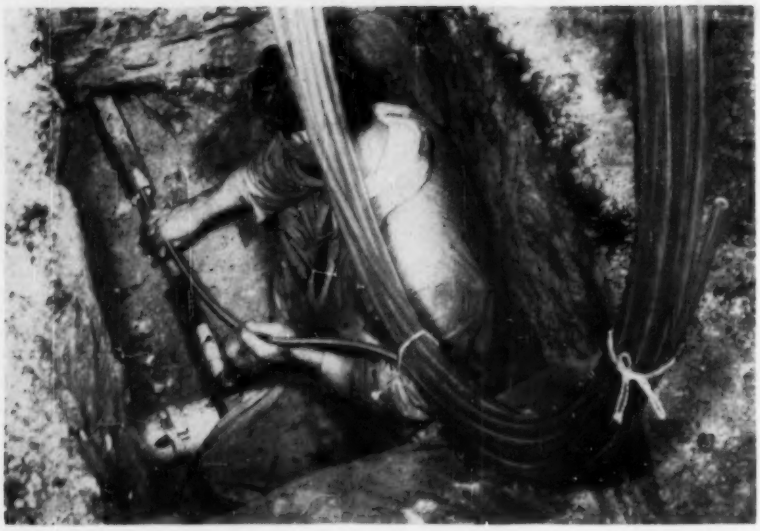
FOR STONE FACINGS, it takes heavy scaffolding, eventually reaching 86 ft. high, over a large area. Hoist tower in center goes to 100 ft. Rough walls are being covered.



LOAD OF ARCH STONE is wheeled aboard hoist platform to be taken up to working level. Concentrated loads are handled safely on well engineered scaffolding.

ARCH FORM in place and facing stone on hand, check is made on blueprint. Stone sections are designed for specific locations and have been numbered for identification.

KEYSTONE is spotted exactly in the center at top of nave arch, almost 100 ft. above floor level. Form is blocked carefully to keep stone sections in exact line and position.



CORROSION-RESISTANT butyrate pipe is being fed through corroded metal pipe several feet underground to cut down on excavation

Plastics Fight Corrosion

Corrosion has been a specter looming over every industry since transmitting liquids began. Now plastics are effectively wiping out that specter

WHATEVER INDUSTRY you are in, corrosion is costing you money. Underground pipe replacements in the U. S. alone cost $600-million last year. But thanks to that chemical miracle, plastics, the high mortality of many pipes, valves, gaskets, tanks, and drums may be falling off rapidly by the end of next year.

Cellulose acetate butyrate, styrene alloys and copolymers, polyvinyl chloride, polyethylene, Saran, glass-reinforced polyesters, epoxies, nylon, and the fluorocarbons have all been put to use in pipes and fittings.

All of these plastics serve different fields, depending on what is expected of them—whether they will be required to withstand high heat, chemicals, acid or alkaline soils, or a combination of all.

Plastic joints attached to metal pipes have recently been used to reduce corrosion by insulating sections of the pipe from one another. In this way, the electrical flow responsible for some corrosion is greatly reduced. Such couplings are made by Plastic Engineering and Sales Corp., Fort Worth, Texas, especially for the fuel gas industry.

Another unusual corrosion-combating material is Saran-lined metal pipe, fittings, and valves. Its unique method of manufacture results in an increased corrosion-resistance factor of about 25%, as compared with unsupported Saran, because the material is under compression within the metallic sheath, densifying its physical structure. Saran Lined Pipe Co., Ferndale, Michigan, has been doing a thriving business in these lined fittings and pipes.

Tanks, ductwork, and other chemical equipment are now being made of numerous types of plastics materials. Filled cast furfuryl resins have been developed that are insensitive to nonoxidizing acids as well as alkalies.

With new thermoplastic resins —methacrylate, polyethylene, Saran, and polyvinyl chloride—many intricate shapes can be formed to make even nuts, bolts, and other fastenings. Equipment, made of these materials and fastened with them, are almost immune to corrosion.

A number of U. S. companies are now working with unplasticized rigid polyvinyl chloride in making exhaust systems, dipping baskets, process equipment, tanks, and tank liners. Atlas Mineral Products Co., Mertztown, Pa., manufactures such things under the trade name Ampcoflex.

Available in complete structures, sheet, or pipe, the material does not deteriorate or change over a wide range of normal operating temperatures. To weld these structures and forms, Atlas uses a special hot-gas welding technique.

Polyethylene containers in a wide range of sizes and capacities are valuable for handling corrosive chemicals such as hydrofluoric acid. Weighing one-third as much as glass, those containers are nonbreakable in normal service.

The Chemical Corp., Springfield, Mass., has been making plastic tanks, fume hoods, ducts, and drain pipes for use in plating plants. Tanks for electroplating in its Pla-Tank line are molded as large as 48x36x48 in. The excellent dielectric properties of Chemical Corp.'s polyester-glass fiber material make it unnecessary to insulate electrical connections from the tank rim.

Corrosion-resistant plastics in pumps, valves, and other items are widely used to handle "problem" products. For example, Grinnell Co., Inc., Providence, R. I., makes effective use of molded Kel-F, polyethylene, and Teflon in its line of Grinnell-Saunders diaphragm valves for handling heavy corrosive materials. With the right plastic, these valves can be made to cover temperature ranges from 0 to 300° F. at pressures up to 150 lb. per sq. in.

Permanent freedom from corrosion is one of the features of a new durable foot-valve for water pumps molded of butyrate. Produced by Nordstrom and Carlson Co., Kenoza Lake, N. Y., the valve is also shatterproof and impervious to most oils and greases. When properly installed, it remains leakproof even after months in the water.

Lindsay Co., St. Paul, Minn., national maker of automatic home

water softeners, has been using an automatic regenerative valve of Kralastic modified styrene, instead of the usual brass. Weighing only one-third as much as the metal valve, the plastic model has been tested at pressures of 750 lb. per sq. in.—more than the maximum required for actual water softening.

Formulation and application of baked-on and catalytically polymerized phenolic coatings for drill pipe, tubing and sucker rods, and other items for the petroleum industry is a specialty of Permolite, Inc., Dayton, Ohio. The Permolizing process is said to increase the life of pipe as much as seven times.

These are only random examples of what seems to be growing into an inexhaustible list of uses of plastics in industry. Invariably, each new addition means savings for industry, resulting in a better product.—Mod Plastics, Sept, p178

Underground Reservoir Provides Mine Air Supply

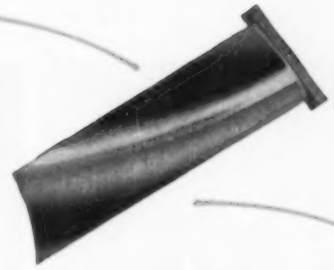
The Rödsand Gruber, A/S, iron mine at Rausand, Norway, had trouble with overloaded air compressors. Because the rock formation at the mine was dense, hard, and free from cracks and fissures, the mine's technical director decided to relieve the strain on the air compressors with the air-reservoir system.

Two 70,000-cu. ft. chambers were excavated in solid rock—one 68 m. above the other. They were connected by a pressure shaft at a 55° angle to the horizontal. The upper chamber served as a water reservoir, while the lower chamber served as an air chamber.

A concrete plug sealed the lower chamber. A 10-in. water pipe pierced the plug and terminated in a sump about 10 m. below the air-reservoir floor. Hydraulic pressure at this point is about 1 kg. per sq. cm. higher than the air pressure required to empty the air reservoir.

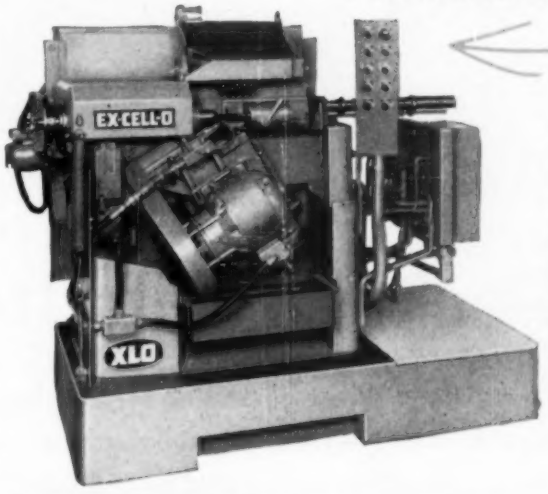
Air from the compressor is forced into the receiver until all water is forced into the upper reservoir, which has an open connection to the atmosphere. This water then maintains constant pressure in the air reservoir.—Eng & Min J, Aug, p92

The airfoil form of a jet blade like this is automatically milled by



EX-CELL-O
PRECISION
PROFILE MILLER

XLO



Style 86 mills the complete airfoil form including leading and trailing edges. Work is supported rigidly by back rests throughout the cutting stroke.

Then — Ground and Polished automatically with —

EX-CELL-O STYLE 87
PRECISION
PROFILE GRINDER

EX-CELL-O STYLE 88
PRECISION
PROFILE POLISHER

Aircraft Engine Builders are getting PRECISION IN VOLUME JET BLADE PRODUCTION from these three Ex-Cell-O blade finishing machines. The machining cycle is completely automatic. Operator merely loads and unloads the work and pushes the start button. Write or cable Ex-Cell-O for further information and specifications.

53-33

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN, U.S.A.
CABLE ADDRESS: XLO, DETROIT, U.S.A.
PRECISION MACHINE TOOLS • CUTTING TOOLS • MACHINES TO PACKAGE MILK IN SANITARY PAPER CONTAINERS

CREAM, one serving in powdered form, is unit-packed in acetate-Pliofilm-foil that keeps it fresh.

INSTANT COFFEE is packaged in colored foil envelopes and put in product containers, twelve to a box.

SOY SAUCE for chop suey is dispensed through a pouring channel in polyethylene-cellophane envelope.

Unit Package Hits Its Stride

This relatively new packaging method has swept into the customer-products field in a big way. Special machines and materials make it one of the least expensive, fastest and most attractive ways to package small items

IN TWO SHORT DECADES the unit-of-use package has matured into a universally accepted packaging method for thousands of products. Strong consumer preference for neatly packed, small servings has been responsible for its success. Fortunately most consumer commodities lend themselves to small packaging, and small packaging is ideally suited to manufacturers' need for high-speed production at minimum cost.

Unit-of-use packages are most familiar in the U. S. as small single-serving packets or envelopes of heat sealing papers, foils, films, or laminations. The units are formed, filled, and sealed by automatic machines and turned out at a high rate in continuous strips.

On the market today in such unit-of-use packages are products as diverse as frozen orange juice, ice-cream toppings, pills, detergents, toothpicks, ball bearings, air-rifle shots, maple syrup, suntan lotion, salt, and tooth paste.

The transparent cellophane unit with heat-sealed edges is probably the best known. But it is now being joined by a number of materials with the necessary thermoplastic characteristics, including coated paper, Pliofilm, coated foil, polyethylene, acetate, vinyl, and many special combinations of these materials. Cellophane itself is used in combination with many of the newer films.

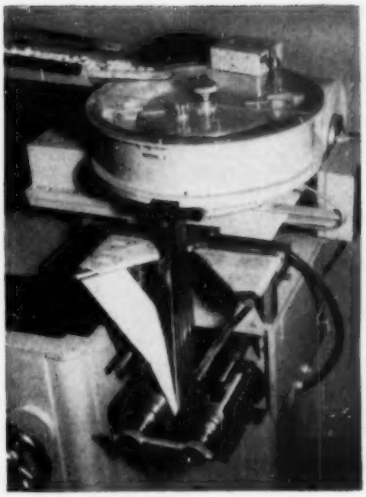
Unfortunately, the manufacturer has no ready checklist to tell him exactly what material to use for his special needs. He must be guided by the chemical requirements of the product, the protection needed, the type of handling involved, and what the customer expects from the package. For most of this information, he can rely on his supplier whose testing and experience tell him what film should be used for what products.

Luster, printability, and dimensional stability are characteristics of acetate film. Vinyl, Pliofilm, and polyethylene are often selected for the inside surfaces of unit packages because of their excellent heat-sealing qualities. Polyethylene is strong, inert, and is found usually on frozen products because it performs so well in subzero temperatures.

Where different degrees of rigidity are desired, different types of coated papers are used to give stiffness and a receptive printing surface at low cost.

New laminating techniques now enable manufacturers to use lighter-gage aluminum foil for laminated structures in high-speed

SQUARE PACKETS of a variety of laminates get formed, filled, sealed, and printed in single operation.



HEADACHE TABLETS, loaded into unit packages four at a time, are run on compact machines like this one.

EYE DROPPERS are individually wrapped in cellophane on this high-speed, inexpensive strip packager.

packaging and still keep high moisture-proof protection. Improved techniques in extrusion-coating of flexible materials, including cellophane with polyethylene, add to the variety of materials for automatic packaging.

One of the latest, polyethylene-coated cellophane, may prove to be one of the best for automatic packing of various chemicals, liquids, and vacuumed products such as sauerkraut, pickles, olives, cherries, window cleaner solvent, and orange juice. The flexible, heat-sealable, chemically inert polyethylene leaves no taste in the product.

Single-service packages of frozen orange juice have recently been marketed nationally at soda fountains. Contents of the polyethylene bag reconstitute to make a 10-oz. serving of juice. Low level of water-vapor transmission at subzero temperatures suits polyethylene to this use. Cellophane, laminated on the bag's outside, is reverse-printed so lettering is protected from the concentrate and scuffing.

Makers of a powdered milk called Sanalac—packed in 3.5-oz. envelopes—have been using a lamination of paper and aluminum foil, coated on the inside with an extra-heavy layer of polyethylene. Where other sealers were ineffective, because of the powdery nature of the product, the polyethylene melts and seals perfectly and permanently.

Pliofilm is incorporated in one laminated structure to provide a longer than average shelf life for shelled pecans. In another instance, a three-ply lamination of acetate, foil, and Pliofilm is giving a life of up to 6 months for Pream, a highly moisture-sensitive powdered cream. Each Pream package is subjected to an atmosphere of inert gas so that it will have a low oxygen content.

For products requiring steam sterilization, such as surgical dressings, sutures, and needles, a lamination of vinyl film and foil is usually best. The vinyl films have a higher seal temperature than polyethylene, which might tend to delaminate at the high sterilization temperature. Also excellent for greaseproofness, the vinyls, when laminated either to foil or acetate, are suitable for hair-cream preparations and certain dry chemicals, as well as for photographic films.

Special sealing methods are sometimes needed to meet peculiar problems, such as the one encountered by makers of Best Aid drink mix. No standard thermoplastic paper would seal the bags of dusty powder at the high speed Best Aid required to keep its price low.

The answer was eventually found in a water emulsion coating applied to the unprinted side of a paper web. A second ½-in. wide application of adhesive was printed on the

TOOTH POLISHERS, used in dental prophylaxis, are individually sealed in cellophane tear strips in dispenser.

HAND LOTION in tiny foil packets are dispensed from a color-printed catchbook carried in handbag and ready for quick use.

Protect your plant and profits with a BLAW-KNOX *Automatic* SPRINKLER SYSTEM

FIRE is no respecter of people, property or profits. It can destroy in minutes what you have spent years in building. So get off fire's "waiting list" *now* by installing the sprinkler system that doesn't give fire a chance!

From blueprints or dimensional drawings of your plant, together with notations of any special fire hazards, Blaw-Knox engineers can determine what equipment will give you the best protection and estimate its cost. This entails no obligation. If satisfactory, we will then design and help to install a completely automatic sprinkler system that's on the job 24 hours a day—ready for instant action whenever the danger of fire threatens your plant and your profits.

The NEW Improved BLAW-KNOX SPRAY-HEAD

BLAW-KNOX

BLAW-KNOX COMPANY
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ETHICAL DRUGS, like these by Ciba, are packaged in a variety of containers that look antiseptic and attractive and give instructions for use at the same time.

MAPLE SYRUP for pancakes is in a duplex cellophane envelope that looks and acts like a pitcher. Its sealing contours and patented bottom allow it to stand on shelf.

edge of the outside surface to assure a secure seal of the vertical overlap. High speed was supplied by a special rotary machine built to package the product at the rate of 290 units per min. from two paper webs.

Heat seal papers are now available for packaging any number of stable products such as sugar, pepper, salt, tea, pills, and seeds. Some of the largest soap and detergent makers in the U. S. are now packaging single-use or sample sizes of their products in envelopes of super-treated coated Kraft paper. The base stock can be laminated and coated to meet special requirements of strength and protection.

Without special packaging machines, however, these special laminations, papers, and films would not go far. Labor costs, too, would obviously make unit packaging prohibitive even with the cheapest packaging materials. New types of machines have been developed to run at tremendous speeds, keeping unit cost extremely low. The manufacturer can now purchase any one of a number of these special machines and do packaging in his own plant.

Some machines for in-plant packaging of this type are surprisingly low in cost and require little upkeep. Some companies, like Ternstedt Div. of General Motors Corp., semi-automatically wraps automobile hardware in individual cellophane envelopes—not for merchandising reasons, but to reduce handling costs and protect parts en route to assembly plants.

Newer machines can even select and feed an assortment of items to different pockets on the same strip of material. They can alternate assortments in any predetermined order. One of the best examples of improved mechanical methods of feeding and packaging products in a strip is a new package for Fepileum vitamins, distributed by Anabolic Foods, Inc., Glendale, Calif. Not only is a clever type of dispenser carton used, but a morning dose of two tablets and one perle—each dose in its own compartment—alternate on the same strip.

Another new machine will simultaneously fill five pockets in a strip alternately with items from five different hoppers. One of the first practical applications is a cellophane tray service unit for airlines and drive-in restaurants. Salt, sugar, pepper, toothpicks, and gum are all neatly packed in small compartments in the same cellophane strip.

A further refinement in equipment now makes it possible to emboss a code number on each unit package as it is being sealed. Armour Crystar, tasteless aspirin for children, carries a number on the sealed edge of the packet—no advance printing or hand stamping is required and the record is always legible. When these unit packages are enclosed in catch covers, the code is sometimes embossed on the edge of the cover at the same time that the strip or single packet is sealed in place.

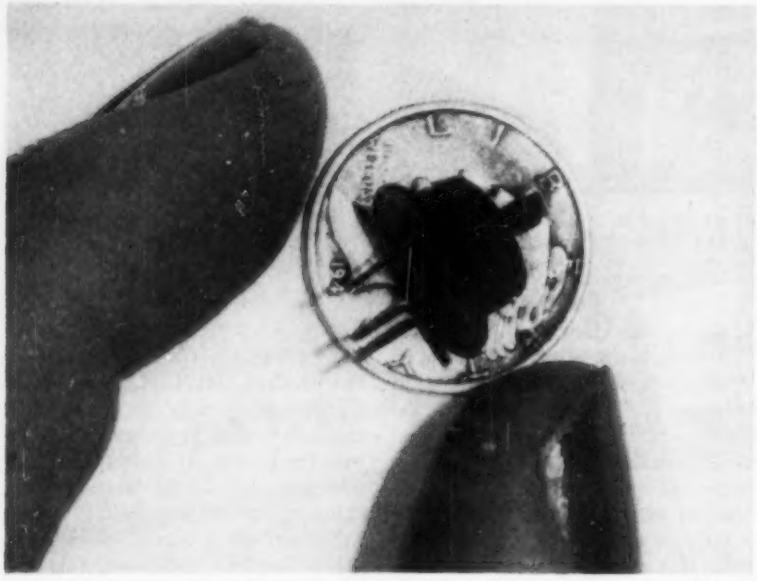
The unit container for liquid offers intriguing possibilities for machine and packing design. Extra precautions must be taken to make the package leakproof. The sealed circumference must be extra wide and the center the right shape to hold the liquid. It was natural that designers of liquid units should think of making the sealing dies in the form of a bottle, pitcher, or other familiar container. Appropriate printing helps to carry out the idea for many table commodities. For instance, a transparent window on an envelope of Vince oxygenating dentifrice is printed in the shape of a bottle and is topped with a printed "cap."

Leakage need not be a hazard in a properly formed and sealed flexible package. One producer of paint pigments has begun shipping them in heavy pouches of laminated cellophane and polyethylene, and reports that, so far, leakage has been less than it had been with collapsible metal tubes.

Machine engineering recently has been concentrating on still other ways to make unit packages easier for consumers to use. One example is a paper pouch for single-cup servings of cocoa. The paper used is a super calendered, heat-sealable type.

So many new applications of unit-of-use packaging are introduced daily that it is hard to keep abreast of them. But a large percentage prove successful over long periods of time from the standpoint of sales, as well as durability. These facts prove clearly that this packing method is long out of its novelty stage.—Mod Pkg, Sept, p89

NEW PRODUCTS



New Transistor Defies Heat or Cold, Puts Out More Power than Other Types

Advances in the engineering of transistors for the electronics industry are coming rapidly. A new transistor recently announced has:

- Power-handling ability (150 millwatts) three times that of other current models.
- An all-welded metal shell that protects the inner workings of the transistor's elements.
- Ability to operate through a wide range of temperatures and to resist moisture.

Called 2N43, it is not affected by either heat or cold. In a demonstration, a miniature transmitter employing 2N43's transmitted a signal while encased in a block of ice. When the ice was melted and the resulting water brought to a boil, the transmitter operated undisturbed.

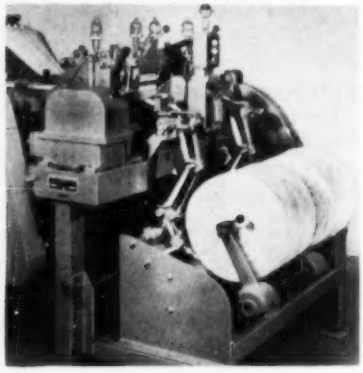
Increased power makes it adaptable to more consumer, industrial, and military uses. But high-power capacities, says the manufacturer, are still to come. A year or more of research will boost the power capacities and raise the operating ranges into the ultra-high frequencies.—**International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**—Business Wk, Sept 12, p56

Two-Knob Colorimeter

Color densities and percentage of light transmission in quantitative analyses can be readily determined with new model monochromatic colorimeter.

Instrument is designed for use in food processing and production control, and in analyzing oils and fats. It is easy to operate. Two convenient knobs give full control. A dual-purpose filter holder accommodates either 2x2-in. or 1x1-in. filters. When holder is removed from light path, light is automatically cut off from photoelectric cell, avoiding damage to sensitive element.

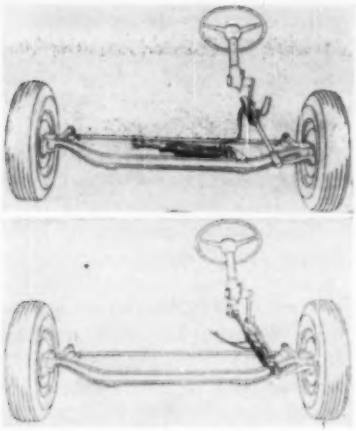
Scale gives direct transmission and density readings by means of floating spotlight.—**Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y.**—Food Eng, Sept, p169



Improved Balling Head

A boost of more than 100% in sliver-processing capacity and large-package 28-in.-high doffing are the result of design refinements in new balling-head pin drafter. Special heavy-duty faller bars and a deep-fluted inner nip roll raise machine's capacity to 2,400 grains-per-yard maximum entering weight per head. Delivery capacity is 3½ oz. per 5 yd., or 306 gr. per yd.

Elevated doffing level attained is the result of a new knee-action compensating mechanism that permits raising of the balling head without increasing the sliver tensioning as the condenser travels from side to side. Possibility of undesired sliver lengthening is eliminated by means of the knee.—**Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio**—Textile World, Sept, p185



Easy Power Steering

New linkage-type power-steering equipment is said to make the installation of the power cylinder and control valve easier for vehicle manufacturers. Geometry of the present linkage need not be changed. In effect, the present steering system remains intact.

The unit's hydraulic power cylinder is mounted at any convenient place where it can act directly on the steering cross rod or equivalent member. Power for steering is then applied in the simplest and most direct way as a straightline motion to the steering linkage of the vehicle.

The control valve of the two-unit type installation (top) is mounted at one end of the ball joints, usually the Pitman arm. An alternate type unit (bottom) combines the control valve with the power cylinder.

The system retains the "feel" of normal steering.—**Bendix Product Div., Bendix Aviation Corp., South Bend 20, Ind.**—Bus Trans, Sept, p46

Air-Powered Circular Saw

Portable circular saw that cuts to a depth of 4⅜ in. is air powered. It is designed for an air pressure of 90 lb. per sq. in. Simple hand screw and thumb screw adjustments regulate the depth and angle of cut.

The 12-in. blade can be easily changed. A complete set of blocks for cutting various materials is available.—**Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.**—Factory, Sept, p180

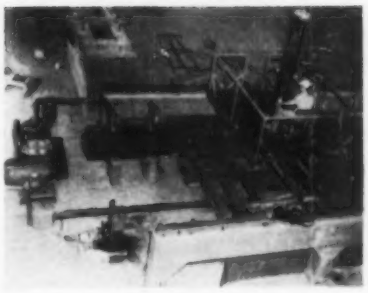
Tool Inspects Cavities

The Inspectroscope is a flexible tipped rod containing a light for inspecting cavities in machinery. The tube fits through a half-inch opening. Lights and a series of 60 complex lenses reflect images back to inspector's eye. Wheel at base of tube turns flexible tip, allowing full inspection of inaccessible areas.—**Eder Instrument Co., 2293 Clybourne Ave., Chicago, Ill.**—Fleet Owner, Sept, p92

Selenium-Cell Rectifier

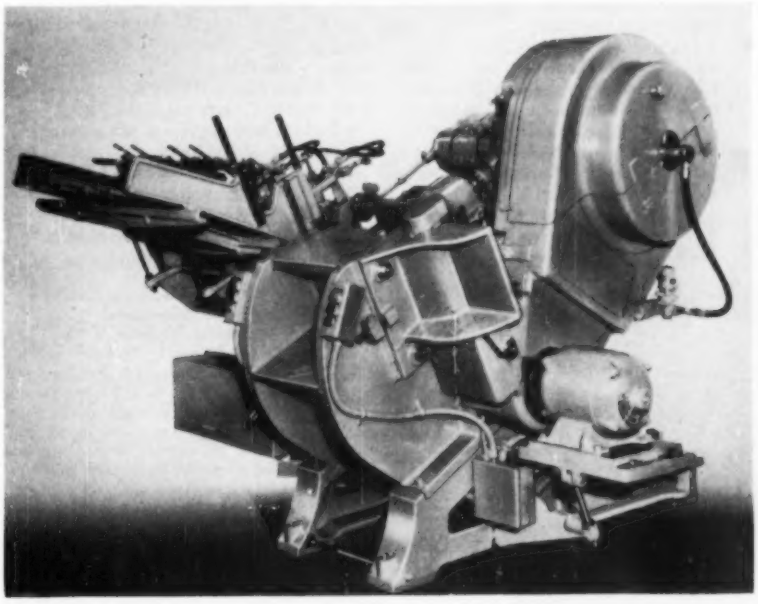
My-T-Midget rectifier is small, self-contained device that provides dc. from an ac. source. It employs selenium cells to do the converting. Plug the rectifier in, flip the switch, and dc. is immediately available.

Its ac. input is single phase 110 v. or 220 v. Sizes range from 1 to 8.5 amp.—**American Rectifier Corp., 95 Lafayette St., New York 13, N. Y.**—Elec C&M, Sept, p158



Machine Breaks Alloy Slabs

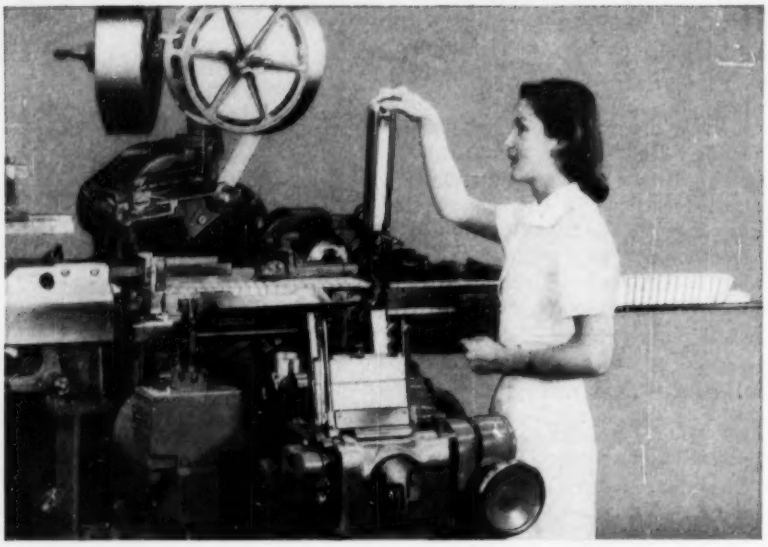
Another job has been mechanized—breaking up alloy slabs, as usually done by sledge hammer and ball. A pneumatic slab breaker does as much in 15 min. as the ball-drop method did in 2½ hr. It is rated at 60 tons per hr. The machine has a 20-ft. span, and its stroke ranges from 42 to 84 in., depending on the impact required. It delivers 50 to 60 strokes per min. with a 64,000-ft.-lb. impact.—**R. P. B. Corp., E. 11th & Orme Sts., Los Angeles, Calif**—Iron Age, Aug 27, p74



Strip-Feed Press Stamps at High Speeds

Model 401 strip-feed press produces can ends, screw caps, other light stampings at high speeds with multiple dies. Continuous-stack feed provides 1-hr. run before reloading. Machine, rated at 25 tons, features welded steel frame, Fawick Air-Flex clutch and brake on crankshaft, and adjustable vacuum cutoff. Latter unit operates in conjunction with crossfeed that takes strips from vacuum cups into and under feedbar on table. Two-hand controls and an electric circuit that is open when the flywheel guard door is open protect the operator's hands and arms.—Baldwin-Lima-Hamilton Corp., Hamilton, Ohio—Am Mach, Aug 17, p157

Production Ideas...



from the Cigarette Industry

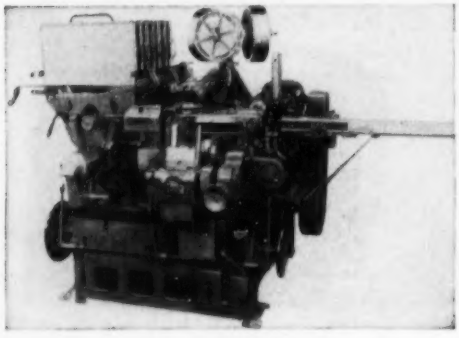
Today, millions of people everywhere can afford the enjoyment of smoking — thanks to low-cost, mass production methods.

During the past 30 years alone, the Cigarette Industry has tripled its output per man-hour. Manufacturers have thus been able to absorb repeated increases in the cost of labor and raw materials, keep retail prices low and continually extend their sales potential.

In close cooperation with the industry, American Machine & Foundry Company has developed and continues to improve the high-speed, automatic machines which make and pack many of the world's best-selling cigarette brands.

The AMF Standard® Cigarette Maker produces up to 1500 cigarettes a minute. In turn, the AMF Standard® Cigarette Packer counts and inspects each cigarette, packages them and applies a tax stamp at the rate of 150 packs a minute!

Similarly, many other industries are developing better production methods with AMF cost-saving, automatic equipment — from single machines to complete plants.



The AMF Standard Cigarette Packer has made the U. S.-type "pouch" pack the accepted standard of most of the world's cigarette smokers. No similar machine is so widely used, and none can match its combination of speed, efficiency and economy. Free literature will be sent on request.

AMF does it better ... automatically!

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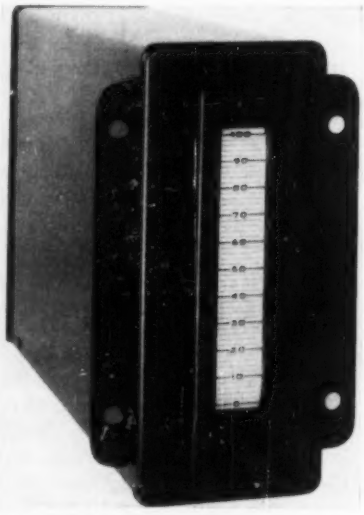
Fiberglas Insulated Range

Oven in new narrow electric household range is 24 in. wide, big enough to roast two 15-lb. turkeys or bake 10 loaves of bread. Fiberglas insulates the unit and permits even baking on any oven rack. Broiling is done with intense infrared heat that seals in natural flavors and juices.

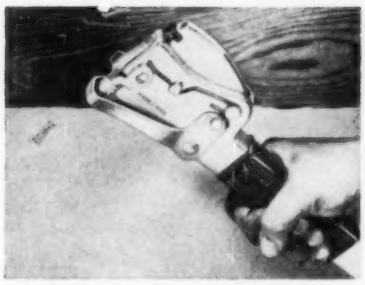
Tel-A-Glance surface units are conveniently located on upper back panel of stove. A single-dial oven control turns on current and sets oven temperature with one easy turn. Unit has appliance outlet for toaster and coffee maker. Full-width storage drawer is mounted on nylon rollers.—**Westinghouse Electric International Co., 40 Wall Street, New York 5, N. Y.**—Elec Merch, Sept, p183



Ribbon-Type Indicator Gives Continuous Record

Model 50 Consotrol indicator is especially suited to indicate valve position or variables such as liquid level. The scale is ⅜x4¼ in. A brightly colored nylon tape, wound on two drums, is drawn behind the glass panel on which the scale graduations are printed. Internal illumination is unnecessary.

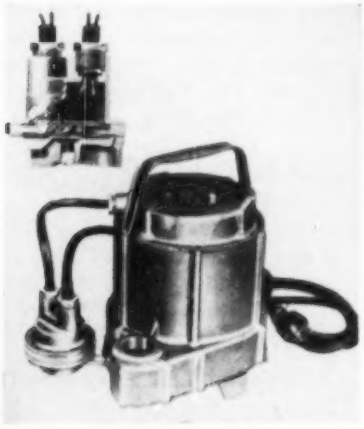
The indicator receives pneumatic measurements from a transmitter located at the process. This force is applied to a receiver bellows that, through a lever and stainless-steel tape arrangement, rotates the two drums on which the nylon tape is wound.—**Foxboro Co., Foxboro, Mass.**—Pet Proc, Aug, p1248



Hammer for Wide Staples

New stapling hammer works with a staple twice as wide as that used by other medium-duty hammers. It is designed for jobs where greater surface contact is needed, such as applying insulation batts, roofing paper, and freight-car linings.

Hammer can be operated with one hand. One blow drives the staple, even into hard wood.—**Bostich, Inc., 609 Mechanic St., Westerly, R. I.**—Factory, Sept, p173



Underwater Sump Pump

Model 109 is designed for completely submerged operation and will fit into a 12-in. cube. Maximum capacity is 3,300 gal. per min. at 10 ft. head.

Liquid-level control switch is actuated by water rising to trap air in the switch skirt. The compressed air flexes a diaphragm, makes the switch contact, and turns on the pump. When the pump is running, pressure flexes a second diaphragm in the switch to hold it on as long as there is water remaining to be pumped.—**Kenco, Inc., 1125 N. Ridge Rd., Lorain, Ohio**—Power, Sept, p184.

Missing Something?

*WATSON-STILLMAN 600 TON STRAIGHT-THROUGH WHEEL DEMOUNTING PRESS

★WATSON-STILLMAN 300 TON STRAIGHT-THROUGH WHEEL MOUNTING PRESS

W-S HYDRAULIC

ESTABLISHED 1848

YOUR FREIGHT CARS, PERHAPS?

Your freight and passenger cars roll *straight* into the shop for wheel-set maintenance repairs . . . roll *straight* out. But what goes on inside?

Do they follow a costly maze of in-plant handling . . . shunted from one remote operation to another, finally to emerge hours, or days, or even weeks behind schedule?

Or do they move *straight through* via Watson-Stillman production de-mounting and mounting equipment?

Your entire line of wheel maintenance equipment waits upon the speed with which wheels come off and go on again after re-conditioning. Don't cripple your maintenance operations with outmoded wheel-handling facilities . . . keep rolling stock rolling with W-S high-speed mounting and de-mounting presses.

Let us tell you about all the other Railway Equipment that is made by Watson-Stillman. Bulletins available . . . Free.

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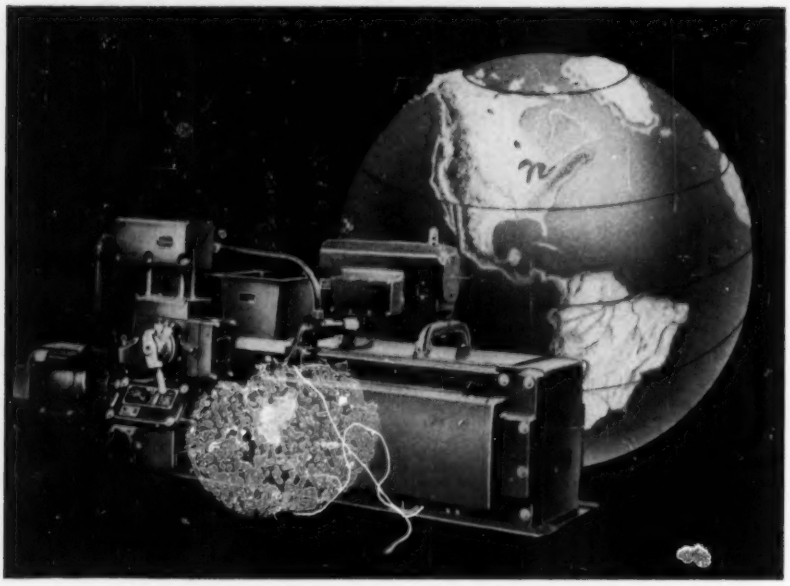

The Merchen way of feeding dry materials in modern processing operations — milling, pre-mixing and continuous blending—has won international approval in many hundreds of installations.

Weighing and feeding in one operation, W&T Merchen scale Feeders deliver the continued minute-to-minute accuracy and dependable performance which help ensure a final product of uniformly high quality.

In addition, by saving time and labor and by minimizing shutdowns, the W&T Merchen Scale Feeder contributes to substantially reduced operating costs.

Accuracy, dependability and economy — these unseen but inherent values are a few reasons W&T Merchen Scale Feeders are a familiar sight in processing installations all over the world.

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F-93

AGENTS IN MOST COUNTRIES

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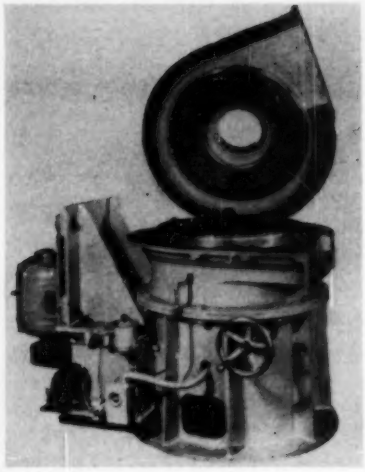
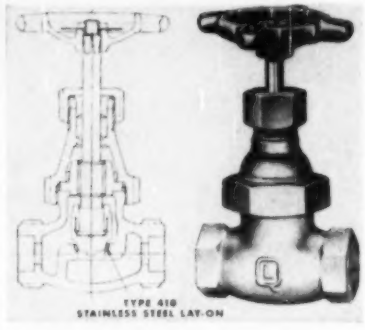


Unit Mixes Pulp Bleach

Bleach mixer gives higher brightness in paper-pulp bleaching through more uniform distribution and bleaching of chemicals with fibers. Chief present use is with peroxide bleaching of pulp. Known as "015" high-density mixer, it differs from conventional mixers in having horizontal disks and a vertical shaft. Replaceable plates have triangular-shaped teeth.—**Jackson & Church Co., Saginaw, Mich.**—Paper Ind, Aug, p584



Valves Have New Features

Redesigned line of 600-lb. small steel globe, angle and check-list valves has been announced. Two new features are a "full-way" plug-type disk with increased seating width and a chromium-stainless-steel seat that eliminates conventional seat rings.

Elimination of ring seats solves ring breakage and ring-joint leakage. Disk and seat scoring is prevented by the combination of hard metals at these points of hardest wear.—**Lunkenheimer Co., Beekman St. & Waverly Ave., Cincinnati, Ohio**—Ind Dist, Sept, p166

NEW PRODUCT BRIEFS

Pocket Pyrometer—Model 240-T pyrometer is pocket size, can give quick, accurate measurements of surface and sub-surface temperatures through use of interchangeable thermocouples. It has 2.4-in. direct-reading indicator scale.—**Cybertronic Corp. of America, Chester, Pa.**—Chem Wk, Aug 8, p51

World of Plastic—Lightweight world globes, molded of Tenite II cellulose acetate butyrate on a butyrate base, will not break. Paper map is cemented on surface with lacquer.—**Rand McNally & Co., P.O. Box 7600, Chicago, Ill.**—Mod Plastics, Sept, p106

Box-car Loader—Belt can handle 80 tons per hr. of bulk material up to 2 in. in size. Operator can load and trim car without entering it. Thrower pivots to reach all corners.—**Stephens-Adamson Mfg. Co., Aurora, Ill.**—Eng & Min J, Aug, p108

Protects Mortar Mixers—Rubber scraper blades by-pass small pebbles that sometimes get caught between steel mixer blades and inside wall of mixer drum. Blades also keep inside surfaces of drum polished for easy cleaning. They are available as optional equipment.—**Muller Machinery Co., Inc., Lake Ave., Metuchen, N. J.**—Eng News-Rec, Sept 10, p179

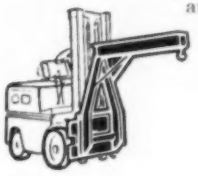
High-speed Tacking Unit—Butt-seam tacking range for rapid tacking of tricots and synthetic and worsted fabrics eliminates turning of selvages where chain-stitch sewing is done ¼ in. from outer edge or edges of the cloth.—**Birch Bros., Inc., 32 Kent St., Somerville, Mass.**—Textile World, Sept, p196

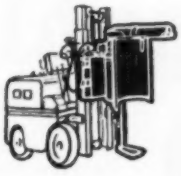
Portable Power—New 1,000-kw. portable diesel generator set is skid-mounted with all necessary fuel tanks, control panel, other accessories. Smaller units in 100- to 500-kw. sizes are also available. Weights range from 5½ to 22½ tons.—**Enterprise Engine & Machinery Co., 18th & Florida Sts., San Francisco 10, Calif.**—Oil & Gas J, Aug 31, p141

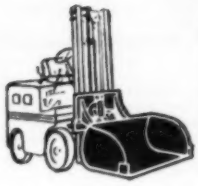
The World over... Multiply Your Storage Space by using CLARK MACHINES

This is the modern method by which alert business men throughout the world are satisfying the need for increased storage space without investing a penny in building costs: the Clark method of materials handling.

Clark fork-lift trucks enable you to utilize your "air rights"—by putting idle space near the ceilings to profitable use. They promote orderly efficient warehouse planning—every commodity in its assigned place. Materials move into and out of storage a great deal faster—making it easy to handle a far larger volume of goods. Accidents and damage losses are sharply reduced. Using unit loads composed of multiple items save much time in taking inventory. Actually, storage capacity is usually doubled, in many instances tripled, by carefully planned use of these powerful, fast, safe, efficient machines.







For full information on this more efficient modern method, consult the Clark distributor. You'll find him a competent counselor on all problems of handling materials at lowest cost. We will gladly give you his name—write to the Export Division, Clark Equipment Company, Battle Creek 70, Michigan, U.S.A.

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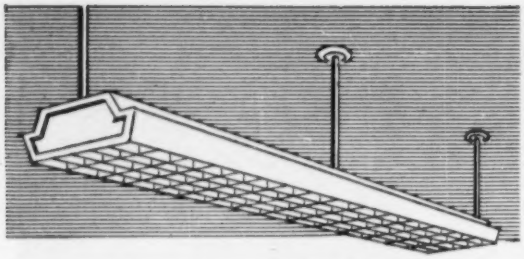

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take paint...and hold it!

They're Republic ELECTRO PAINTLOK* and ELECTRO ZINCBOND— the zinc-coated sheet steels that are chemically-treated to take paints, lacquers and synthetic enamels . . . and hold them all equally well.

Their tight zinc coating will not crack, peel or flake during normal fabrication. It lubricates dies, and extends die life. It protects against underfilm corrosion wherever the painted surface may be scratched or broken.

ELECTRO PAINTLOK is available in U. S. Standard gages 12 to 24 . . . ELECTRO ZINCBOND in U. S. Standard gages 25 to 37 . . . in sheets and coils. Use them for cabinets of all kinds, electric light fixtures, window blinds and shades, as shown above . . . and for display stands, steel furniture, signs, film containers and reels, boxes, partitions, household appliances, metal tile, vending machines, caskets . . . wherever you want *lasting* paint adherence on a steel surface.

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REPRESENTATIVES IN PRINCIPAL CITIES OF THE WORLD

MANAGEMENT REPORT

Maximum light without glare was the chief objective in design of Anniston National Bank Building, Anniston, Ala. Electrically-powered vertical louvers on the building's front and side does the trick. The louvers are adjusted according to the path of the sun, cutting off the direct rays from the building's interior.

Louvers fit right in as an integral part of the bank structure. They are aluminum on the outside and bronze on the inside. Artificial lighting is designed for unusual effects. A central point will control the amount, direction, and location of illumination. —Am Business, Aug, p6

Do you have enough machines in your plant? Consider this: Standard Pressed Steel Co. has ten machines for every eight operators. That sounds like too many machines, but the company figures it costs less to shift a man from one machine to another than to shift a machine from one job to another. Interest on a $10,000 machine is less than $10 a week.—Am Mach, Aug 17, p95

How does U.S. marketing research stand today? You can get a good idea from a survey of 168 companies released by the American Management Association. Here is how companies answered some key questions:

- How much are you spending on market research? Answer: The over-all average (most companies that replied had a sales volume of over $5-million) was 10¢ for each $100 of sales.
- What is the trend in expenditures, up or down? Answer: Six out of 10 companies planned to spend more in 1953 than in 1952.
- What is the weakest area in present market research practice? Answer: More than a fifth of the companies said trying to figure out sales potential. Next came improved techniques in sampling, interviewing, tabulation, and advertising research.

Going on the theory that anyone who owns part of your business will be a prize customer, the Mayfair Markets chain in Southern California has started offering shares of stock through its newspaper advertising at $60 per share.

Chain President Charles Cramer called it an "experiment in marketing" as he cautiously offered the first block of 5,000 shares for sale. But public response was quick and reassuring. "So far," said Cramer recently, "the plan has achieved some excellent customer relations, as it gives the customer an added incentive to spend money in Mayfair stores rather than elsewhere."

Cost to Mayfair is practically nothing because advertisements are run as inserts in space purchased at food linage rates. And store employees themselves close the transaction with after-hour follow-up calls to prospective stockholders.

Over-machining can raise production costs in your plant to an astounding level. Here is an example: A Cleveland firm was turning, milling, and honing parts when specifications called for 125 microinches; it was getting a finish of 8 microinches—an unnecessary luxury. Now parts are finished on a lathe alone and the cost is estimated at a quarter of the previous cost.

To make sure that finish is satisfactory—neither too good nor too poor—requires accurate measurement. A handy instrument, the Surfindicator, was developed by General Motors Corp. to give a quick inexpensive reading. Brush Electronics Co. now makes the instrument under license.—Iron Age, Aug 20, p63

More and more companies today are going in for long-range planning. But peering ahead into the future at present is a hazardous venture. T. F. Bradshaw of Cresop, McCormick & Paget, New York management consultants, thinks the right people have not yet taken on the job of research in planning methods.

He suggests that the universities are ideally suited for the job because they are already equipped for it. They can provide research teams made up of men already trained in analyzing the various business functions. They do not serve only a single business function. But most important is that the universities are committed to basic research—not to answering management's immediate needs.—Business Wk, Sept 12, p139

There is an old saying that a worker is safer on the job than off. At General Motors Corp., for instance, a 12-month study showed four lost-time, on-the-job accidents for each 1,000 employees. Off the job the figure was 22 per 1,000.

But—and here is how GM's safety training appears to pay off around the clock—the off-the-job accident ratio for all industrial workers in the same period was 44 per 1,000. It is an important added value for your safety program; it keeps healthier, better-producing workers on the job.

While on the subject of safety, E. I. du Pont de Nemours & Co.'s Old Hickory rayon plant (3,500 employees) deserves applause for hanging up a new world's record: 28,160,000 man-hours over 4 years without a lost-time injury. And it is still adding to the total.—Factory, Sept, p131

PRODUCTION IDEAS

from Manufacturers' Catalogs

Better Gear Shaving—Bulletin S53-7 describes an important new development in gear shaving: automatic differential up-feed and conventional crowning now available on machine model GCU.—National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.

Cold Roll Forming—Book covers techniques and equipment needed for cold roll forming for a variety of products. Advantages include savings in material and labor costs.—The Yoder Co., 5517 Walworth Ave., Cleveland 2, Ohio.

Speedweigh Scales—Bulletin 1416 M describes Speedweigh scales, which are available in three sizes. Wide-angle dial speeds reading.—Toledo Scale Co., Toledo 1, Ohio.

Instruments—Bulletins are available on combustible-gas, toxic-gas and dust instruments. Please specify which bulletins you want.—Mine Safety Appliance Co., Pittsburgh 8, Pa.

Power Distribution—Bulletin B-5835 covers full line of secondary power distribution equipment, including bus duct, circuit breakers, safety switches. —Westinghouse Electric International Co., 40 Wall St., New York 5, N. Y.

Extrusion Presses—Bulletin 340-A gives specifications of aluminum-extrusion presses of a wide range in size.—The Watson-Stillman Co., Roselle, N. J.

Dehydrators—Ardrier dehydrators for rapid removal of moisture from many products by flash drying are described in a series of bulletins.—The Heil Co., 3026 W. Montana St., Milwaukee 1, Wis.

Masonry Drills—Circular describes regular spiral and fast-lead masonry drills and sets for drilling concrete, brick, slate, marble, and other types of masonry materials.—Whitman & Barnes Div., United Drill and Tool Corp., Plymouth, Michigan.

Filtration Equipment—Descriptions of oil and coolant filters, clarifiers, conveyors, and oil and chip-handling equipment are given in folder.—Honan-Crane Corp., Lebanon, Indiana.

Hard-tip Saw—Circulars feature the disposable hard-tip circular saw and its cost-cutting advantages.—F. Heinemann Saw & Mfg. Co., Canton 6, Ohio.

Vertical Pumps—Construction features of small vertical pumps for side-wall or submerged mountings are described in catalog 52B6975A.—Allis-Chalmers Mfg. Co., General Machinery Div., Export Dept., Milwaukee 1, Wis.

N-phenylmaleamic Acid—Bulletin 30 gives the physical and chemical properties of this acid as well as its potential applications.—American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

Precision Grinder—Style 84 surface form grinder for grinding flat, grooved or curved surfaces in an automatic cycle is described in bulletin 50226.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

D-c. Drives—Catalog GER-655 covers adjustable voltage d-c. drives for rubber and plastics manufacturing plants. —International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Tractors—Catalog E-4-C describes and gives specifications of models W-9 and WD-9 farm tractors with 4- to 5-plow capacity. — International Harvester Co., Harvester Bldg., Chicago, Ill.

Engines—Bulletin 202 illustrates and describes the construction, operation, and application of two-cycle Duafuel engines with instant change-over from oil to natural gas.—Nordberg Mfg. Co., Milwaukee, Wis.

Protective Coatings—Coatings for protection from corrosive fumes and splash on concrete, metal or wood structures are discussed in bulletin 7-1.—Atlas Mineral Products Co., Mertztown, Pa.

Steam Generators—Modern piledriving and extracting with steam generators is described in folder RM-108-449-8-30M.—Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis.

Materials Dispensing—Catalog 40 gives data on power-operated pumps, spray guns, hose, and accessories for applying materials and compounds.—Lincoln Engineering Co., 5730 Natural Bridge, St. Louis, Mo.

Flatwork Ironing—Mechanized flatwork ironing for family laundries, linen supply plants, hotels, and institutions is the subject of this catalog. —American Laundry Machinery Co., 40 East 34th St., New York, N. Y.

Surface Grinder—Form 279 illustrates and gives specifications of No. 18 surface grinder and work done on the machine.—Blanchard Machine Co., 64 State St., Cambridge, Mass.

Ophthalmic Instruments—Catalog is a compilation of 14 bulletins on many types of ophthalmic and diagnostic instruments and their accessories.—Bausch & Lomb Optical Co., 635 St. Paul, Rochester 2, N. Y.

Hydraulic Presses—Bulletin 216 illustrates the features of single-, double-, and triple-action hydraulic presses.—Clearing Machine Corp., 6499 W. 65th Street, Chicago 38, Ill.

Alloys—Alloys for process industries are described in bulletin PI-3. Facts about Ampco metal are given in bulletin G-1.—Ampco Metal, Inc., 1745 S. 38th Street, Milwaukee 15, Wis.

Motors—Form F1784 covers totally-enclosed and explosion-proof motors for dangerous, damp and dusty locations.—U. S. Electrical Motors, Inc., Terminal Annex, P. O. Box 2058, Los Angeles 54, Calif.

Cutting Tools—Handbook tells how to design, make, use, and maintain Firthite sintered carbide tools.—Firth Sterling Steel & Carbide Corp., 3113 Forbes St., Pittsburgh 30, Pa.

Pipe Fittings—Cast iron, malleable, bronze, and steel pipe fittings are described in catalog pf-1951.—Grinnel Co., 260 West Exchange St., Providence, Rhode Island.

Conveyors—Portable belt conveyors and conveyor belts for handling bulk materials are described in bulletins 362, 363, 374, and 3668.—Barber-Green Co., Aurora, Ill.

Business Machines—All-electric adding machines and cash registers, as well as their accessories, are detailed in catalog SA-17R3.—Clary Multiplier Corp., San Gabriel, Calif.

Modern Maintenance—Catalog lists more than 100 specialized products for ceiling to floor maintenance. List includes cleaners, waxes, finishes, deodorants, germicides.—Hillyard Chemical Co., St. Joseph, Mo.

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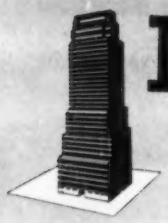

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Ivan A. Given
Editor, Coal Age

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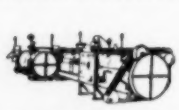

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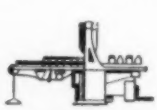

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